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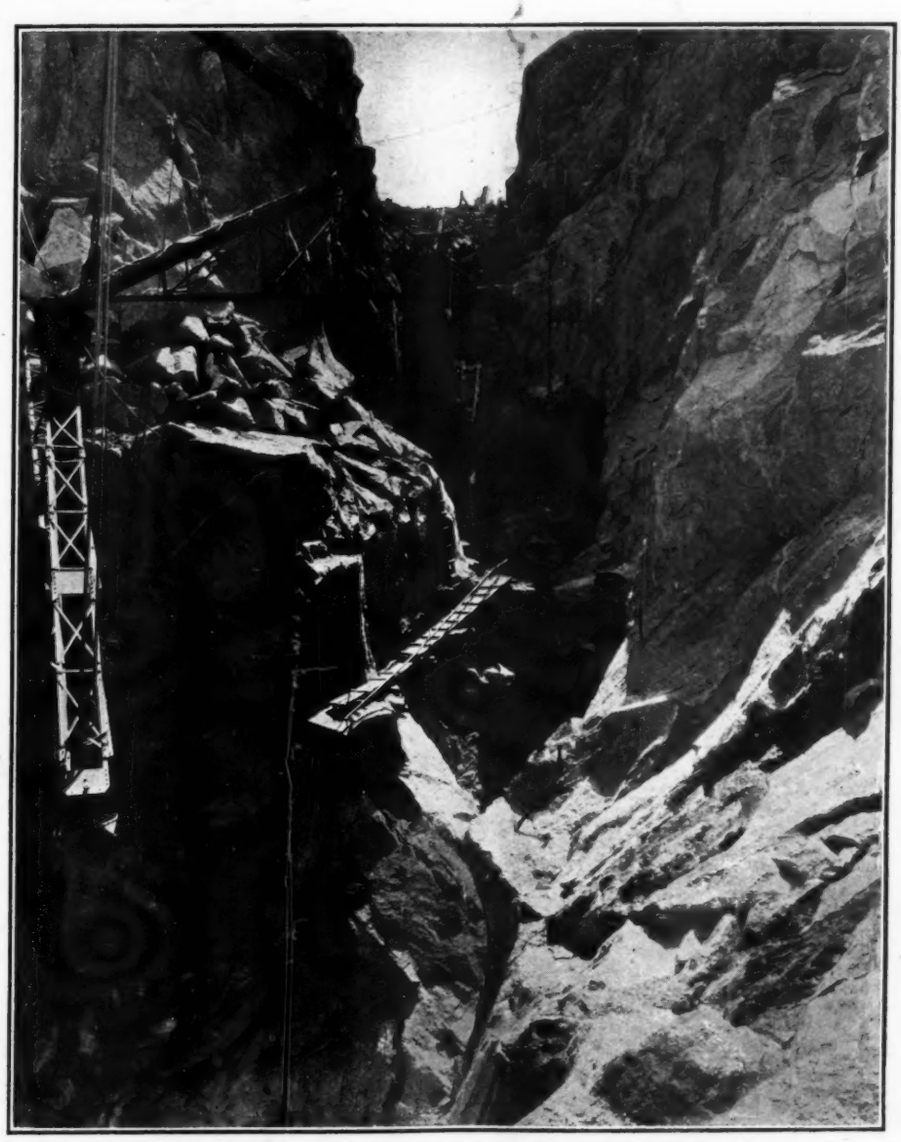
JUL 20 1922

# PUBLIC WORKS

CITY COUNTY STATE



DOWN-STREAM VIEW OF BOTTOM OF FOUNDATION PIT OF HETCH HETCHY DAM.

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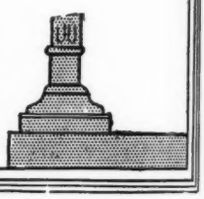

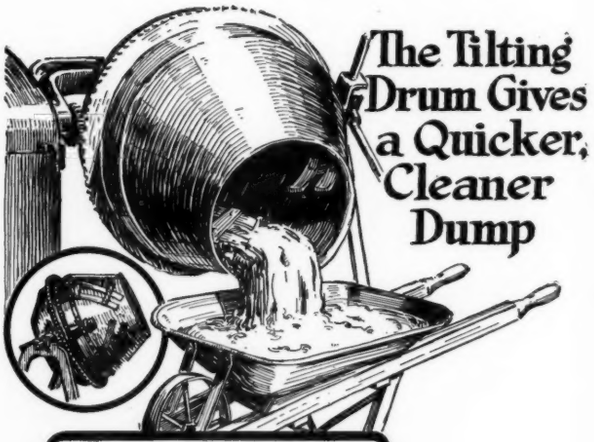

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VOL. 53 NO. 3

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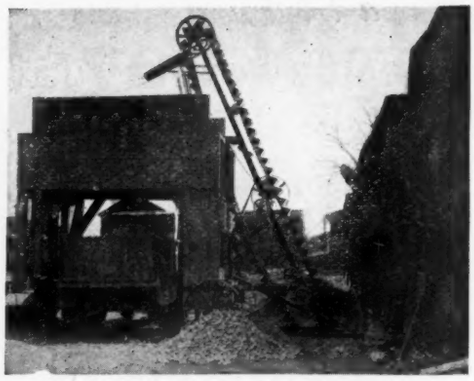

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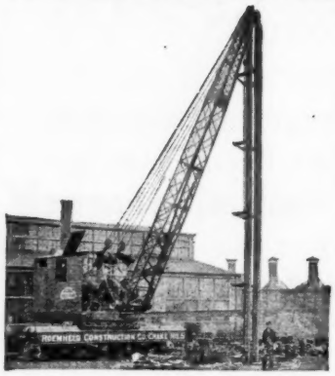

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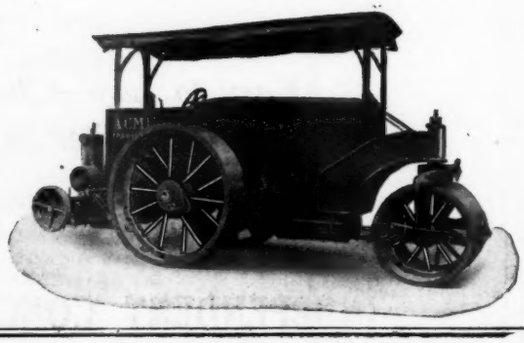

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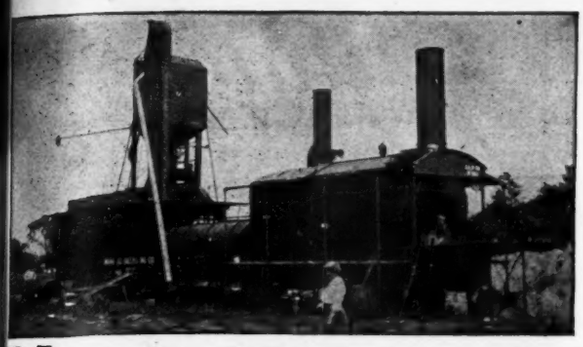

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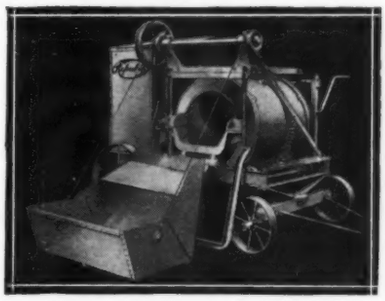

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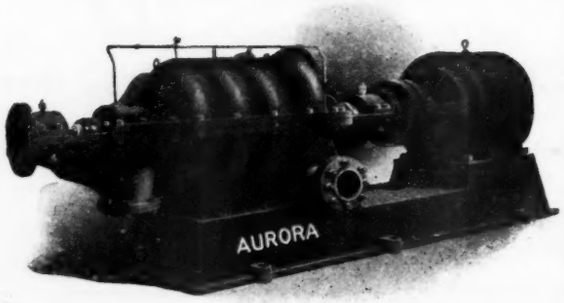


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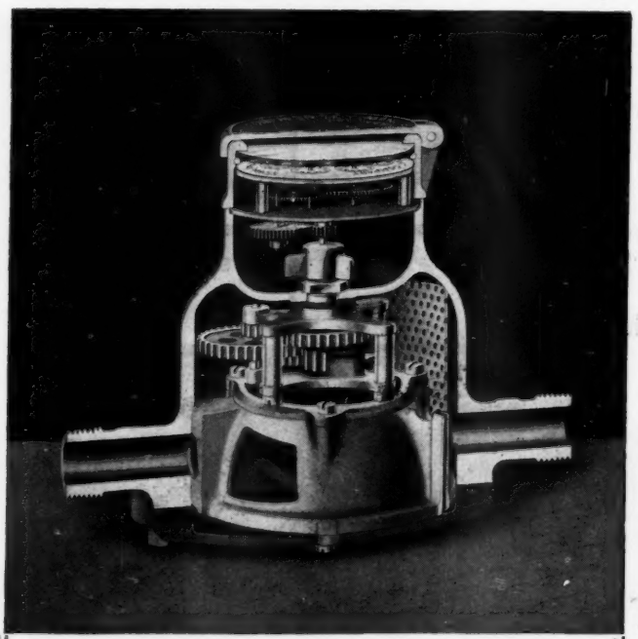

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# PUBLIC WORKS.

CITY COUNTY STATE

A Combination of "MUNICIPAL JOURNAL" and "CONTRACTING"

Vol. 53 July 15, 1922 No. 3

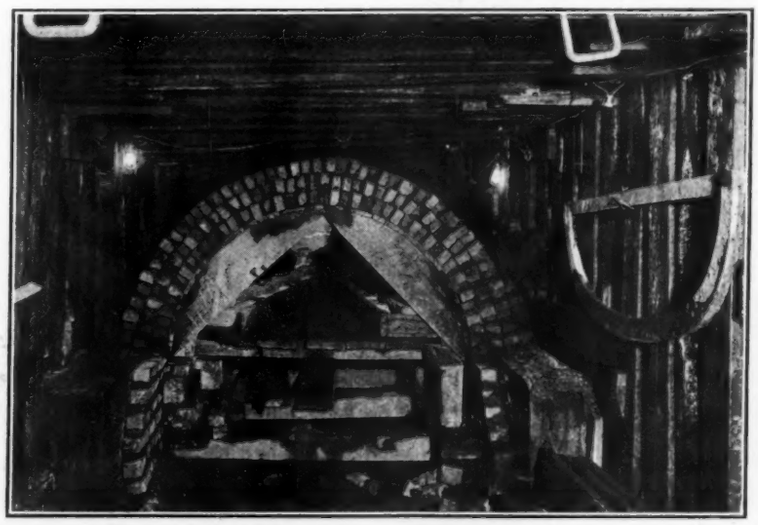

# Negley Run Relief Sewer

**Construction of 3,548 feet of 72 and 78-inch brick and concrete sewers in open trench and tunnel, with trench excavation backfilled by traveling overhead machine.**

The Bennett street section of the relief sewer in the Homewood Brushton district of the Negley Run drainage basin, Pittsburgh, is about 5,000 feet long and has cost about $258,000. It includes 3,800 feet of 3-ring brick sewer 6 feet in diameter and 1,200 feet of 78 x 75-inch concrete sewer. About 700 feet of the brick sewer was built in a 9-foot 6-inch diameter rock tunnel driven from two shafts. The remainder of the brick sewer and the reinforced concrete sewer was built in an open trench with a maximum depth of 32 feet. The work was designed and supervised by the Bureau of Engineering, Department of Public Works, John Swan, director, C. M. Rippert, chief engineer, and I. C. Palmer, assistant chief engineer in charge. Christ Donattelli was awarded the contract March 3, 1921, and commenced the work March 16, and has carried it on with an average force of 60 men.

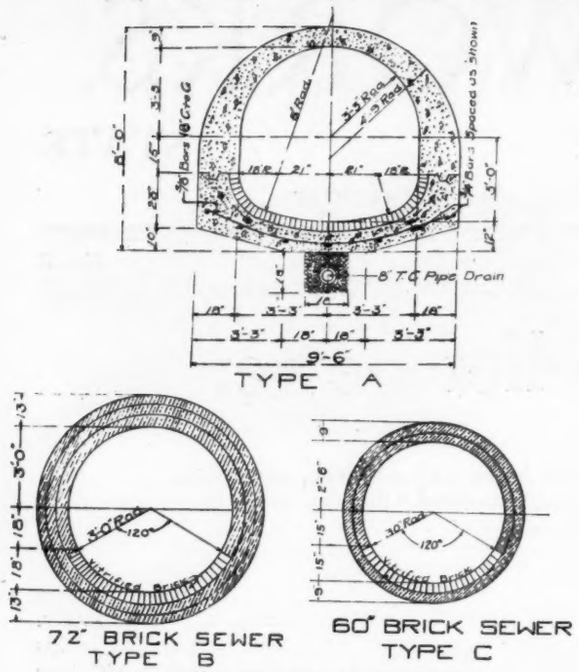
The contract includes 22 manholes, two catch-basins and numerous inlet connections, short lines, small terra cotta pipe, four intersection chambers and the connection with an existing relief sewer. The sewer makes two 90-degree long-radius bends and has several sharp grades following the surface slopes.

The trench excavation was largely in dry earth requiring little pumping except for surface drainage. The upper strata are loose and unstable, requiring in some places sheeting of two tiers of 2-inch wooden planks driven by hand mauls as the excavation progressed and braced with a maximum of eight tiers of cross braces, adjustable jack-screws being used. In some places the upper strata were hard and stable so that sheeting was required only in the upper part of the trench.



BUILDING BRICK ARCH SECTION IN TUNNEL.

The soil was excavated by pick and shovel and then, in the trench work, was loaded into four half-yard steel buckets hoisted by the traveler of a Potter conveyor installation equipped with 400 feet of movable trestle mounted on a 9-foot gauge track laid on the surface of the ground alongside and spanning the trench. The traveler was traversed and the




STANDARD SECTIONS OF SEWER.

hoist operated by three cables run to a Lidgerwood double drum hoisting engine installed on a movable independent platform at the end of the conveyor track.

The soil was thus hoisted as excavated, carried back to a section over the finished sewer and deposited there for backfill at one operation without rehandling. As fast as the excavation and sewer construction advanced a hundred feet or more the conveyor machine and its engine were moved forward to command the section under construction. With this equipment a force of about 20 men was able to excavate and backfill about 45 yards of earth in one ten-hour shift.

The concrete sewer, 78 inches wide and 75 inches high inside, has reinforced concrete invert lined with vitrified brick and is 9½ feet wide and 8 feet high over all, containing about 1.05 cubic yards of concrete per linear foot of finished sewer. After the excavation was completed a trench 18 inches wide and 18 inches deep was dug in the center line and filled with broken stone surrounding an eight-inch terra cotta drain pipe laid with open joints.

The sewer was built in two operations, the invert being constructed up to a total height of 4 feet above subgrade by the usual method, with wooden top forms made in 10-foot lengths. A longitudinal recess was provided in the top of each side of the invert wall to bond with the key of the arch concrete poured in 20-foot sections over wooden forms adjusted by wedges.

The upper parts of the side walls and the arch were concreted in a single operation with three 20-foot sections of Blaw-Knox forms adjusted by wedges and shifted on a car traveling on the 24-inch service track in the invert. The concrete was mixed in a portable quarter-yard Ransome machine moved along the side of the trench and delivering through short wooden chutes to the forms as required.

This section of the sewer was built at a rate of 10 feet per day by an average force of 20 men working at the forms and concreting and 40 men excavating and backfilling.

The 700 feet of tunnel about 10 feet high and 7 feet wide was excavated at the rate of about 5 linear feet per ten-hour shift in each of two headings from each shaft (four headings in all) by average forces of 8 men per heading per shaft. It was permanently timbered with bents about 2 feet apart in the clear between the 6 x 8-inch timbers. After the subdrain was laid the invert and lower part of the side walls were concreted in one operation, after which the vitrified brick invert lining was laid, and the three-ring brick arch was built in 12-foot sections supported on ordinary timber centers.

## Blowing Fine Material from Sand

Loose sand containing 20 per cent. very fine material was made satisfactory for concrete road building purposes in California by subjecting it to a blast from a centrifugal blower while falling through a narrow opening from a hopper to a storage bin. The blower was operated by the engine driving the revolving screen through which the sand was first sifted. Regulating the air pressure enabled any desired proportion of the fine material to be blown away and reduced its amount to below the five per cent admissable by the specification. This method was found profitable with dry sand.

CONVEYOR SYSTEM FOR HANDLING SOIL TO BACK-FILL.

# Road Work in North Carolina Mountains

By Ray S. Blinn*

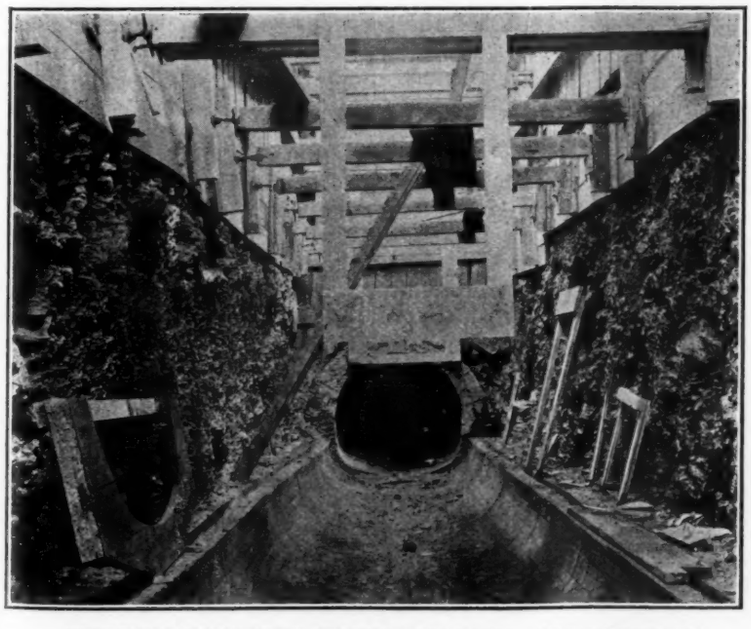
Alleghany county, N. C., lies on a high broken plateau between the Blue Ridge and Peach Bottom mountains at an elevation of about 3,500 feet above sea level. There are no railroads in the county. A federal aid highway project under state supervision is now being constructed from the southeast to the northwest through the county.

The county is undertaking to improve about 40 miles of roads tributary to the federal aid highway by grading and constructing culverts. In these tributary roads, ruling grades are fixed at 5 per cent. and compensated for curvature, although on short stretches grades as high as 7 per cent. are used but are capable of reduction later. The soil is principally loam with red subsoil, although gneiss in upended strata is frequently met with. The road is graded 20 feet wide, with an 18-inch crown measured from the bottom of the side ditches. The grading varies from about 10,000 to 6,000 yards per mile and 18 miles of it has been contracted for at 38 cents per yard for unclassified excavation. The average cost, including culverts and bridges, is expected to be kept well under $4,000 per mile. It is proposed to maintain the roads by dragging and to gradually improve them by top-soiling, as is common practice in North Carolina.

The district being so inaccessible, the matter of culverts and bridges was the most difficult problem. No material from outside of the locality is being used except structural hardware such as drift bolts, nails and tie rods. As the county contains abundance of white oak, with chestnut oak, water oak and chestnut also available, it has been decided to construct all small culverts of plank and to use logs for the larger openings and wooden bridges for spans above 10 feet. This decision was reached because of (1) excessive cost of transporting cement, crushed stone and sand for concrete, (2) cheapness of white oak timber, (3) replacement cost of timber is less than the annual carrying charges for more permanent structures, (4) there are no existing openings to serve as guides in determining size of water ways, (5) topographical maps are not available for studying run-off problems accurately.

It is estimated that white oak or any of the other timbers named will last at least 10 years and possibly 20 years without renewal.

* Locating engineer, Mount Vernon, Ohio.



BUILDING CONCRETE SECTION IN DEEP, OPEN TRENCH.

# Pennsylvania State Highway Equipment

**Plant and mechanical apparatus kept for maintenance work on 10,200 miles of improved highways of many types. Costs, repairs, renewals, rentals, etc., systematically accounted. Plant issued on requisition and charged and credited to respective jobs.**

The rapidly increasing annual motor vehicle traffic in Pennsylvania is carried over the great north-south, and east-west trunk lines connecting the principal centers of manufacturing and population and the secondary lines connecting the smaller towns and villages which form the 10,200 miles of the State highway system. These roads are maintained by an important division of the State Highway Department through its staff of 139 salaried employees including 15 district engineers of the districts into which the State is geographically divided. It has a maximum of 10,000 skilled and unskilled laborers who constantly patrol the roads and perform the routine and special services required to preserve the wearing surface, repair the wear and tear on it and in many cases remove the snow in winter.

The equipment bureau which forms part of the Management Division, has its principal headquarters at Harrisburg. It has a staff consisting of equipment engineers, mechanician, chief inspector, assistant inspectors, foremen, clerks, mechanics, helpers, and chauffeurs. It is supplied with a variable and increasing amount of mechanical equipment with a present inventory value of about $2,600,000, which is stored at large yards and warehouses in Harrisburg, Greensburg, Chambersburg, Gettysburg, Hollidaysburg, Witmer, York, West Chester, Langhorne, Bedford, Media, Washington and Uniontown, and at depots established in each of the 15 geographical districts.

There are, besides, quantities of road-building materials, such as broken

stone, sand, cement, bricks, asphalt, culvert pipes, guard rails, etc., kept in storage at various central points and sand pits and quarries are located and operated at several places where suitable deposits have been found. It is estimated that in 1921 a total of about $3,700,000 worth of materials were used for maintenance purposes and $5,000,000 expended for labor, while the mechanical equipment, rental and supplies if computed on the usual commercial basis probably amounted to $900,000.

PRINCIPAL EQUIPMENT

An approximate list of the items of mechanical equipment owned by the department last fall included 765 one-ton to five-ton motor trucks with dump and cargo bodies of miscellaneous make, including Packard, Pierce-Arrow, Denby, Kelly-Springfield, Nash, Garford, International, and light and heavy aviation trucks; 161 automobiles of which 74 were Ford roadsters, 4 Cadillacs, 7 Franklins, 1 Stutz, 31 Dodge, 42 touring Fords, 1 Hudson, 1 Personell and 1 Hupmobile. There were 102 450-gallon sprinklers of miscellaneous makes, 41 street sweepers, 1 Kinney road planer, 8 locomotive cranes of 20 to 30-ton capacity, and of Browning, American and other makes, 58 chip and gravel spreaders, 9 Baker-Maney wheel scrapers, 24 4,500-pound Buffalo-Pitts scarifiers, 272 road machines (mostly Champion), 79 5-ton Holt tractors and 25 tractors of miscellaneous makes, 191 Watson 1-1½ yard dump wagons, 19 gasoline driven Ingersoll-Rand and Schram air compressors, 10 Wood steam-driven tripod rock drills, 110 gasoline pumps of miscellaneous makes, 90 10-ton Kelly-Springfield, Austin and Buffalo-Pitts rollers, 43 9/16-inch jaw crushers mostly Champion No. 3 and No. 4, 16 Frick, Russell and Farquhar tractor engines, 25 Ransome, Koehring, and Austin and Western Road Machinery Co. concrete mixers, 12 gasoline driven 24-inch gage locomotives, 5 of Bell, 1 of Reed, and 6 of Whitcomb make, and 4 Davenport (steam), 131 Koppel one-yard dump cars, 5 Lakewood concrete finishing machines, 5 Lakewood concrete subgrader machines, 5 Osgood 3/4-yard steam shovels, 3 Baker asphalt surface heaters, 5 Bell truck trailers, 7 Good Roads Machinery Co.'s stone unloaders, 17 steam hoists, 2 5-ton derricks, 1 Warrenite asphalt portable plant, 1 Allentown Cement Gun Co.'s cement gun, 21 150 to 400-gallon Baker asphalt heating kettles, 10 one-yard dump carts, 86 Alger and Syracuse road plows, 64 rooter plows and 69 snow plows mostly made by the Good Roads Machinery Co., 20 Farquhar 30-horsepower steam boilers, 51 blacksmith forges, and 22 Good Roads Machinery Co. electric firing batteries.

DISTRIBUTION

On the 25th of each month, each of the 53 district superintendents files a monthly distribution and available report of equipment, listing the equipment located in his district that is available and will be transferred upon given dates. This is made out on a printed form ruled with eight vertical columns with the titles—department number, kind of equipment, route of application, charge number, date available for transfer, to be transferred when available to (sub-titles, route or application, charge number and shipping point).

At the bottom of the same page there is a space headed "I am in need of the following equipment which is not available in my district" and ruled in seven vertical columns for the titles—department number, kind of equipment, route or application, charge number, date desired, estimate of time to be used, and shipping point. The sheet is approved by the district engineer and signed by the superintendent.

Requisitions for equipment are made out on standard 7 1/2x8 1/2-inch blanks giving serial number and date and requesting that equipment be furnished as shown by entries in seven columns titled—quantity, size, kind, desired, promised, ready, and delivered; to which is added statement of route, application, county, township or borough, kind of work, directions for delivery, signature of receiving official and memorandum of condition when delivered, and of tool equipment signed by the official and countersigned for acceptance.

TRANSFERS

Orders for transfer of equipment are made out on 4¼x9¼-inch cards approved by the assistant engineer and signed by the superintendent of one district and addressed to the superintendent of another district, who is instructed to transfer the designated equipment not later than a given date to a given place via given route corresponding to the required route, county, application and charge number, and with State Highway Department bill of lading and memorandum copy forwarded to district engineer. The card has blanks for description of condition of plant, repairs necessary, date of shipment, department bill of lading number, signed by the superintendent and approved by the district engineer, and returned to the Maintenance Division.

## Rapid Erection of Trolley Bridge

A six-panel trestle bridge of the Holyoke Street Railway across a canal was erected in seven hours by a simple method and with practically no equipment except a donkey engine and cable, some track ties and the material of the bridge, smoothness and rapidity being secured by working out the plans and making all arrangements in advance for the uninterrupted procedure of operation.

The steel stringers were bolted together to form three 50-foot sections, two of which, on opposite sides of the canal, projected nearly half their length beyond the water line while the canal was being drained. As soon as the canal was drained, the extremities of the cantilever arms of the stringers were supported on cribs made up of track ties, and transverse bents to form the two center towers were slipped over them to bearings on mud sills, revolved into position, braced and guyed, after which the transverse bents were revolved from inclined to vertical position bringing the 50-foot sections of stringers to the required position and level as they were moved by the hoisting engine. The third 50-foot section of stringers was then rolled out over the end sections to position and the bridge was completed and the cribbing removed and water admitted to the canal.

# Hetch Hetchy Dam Excavation

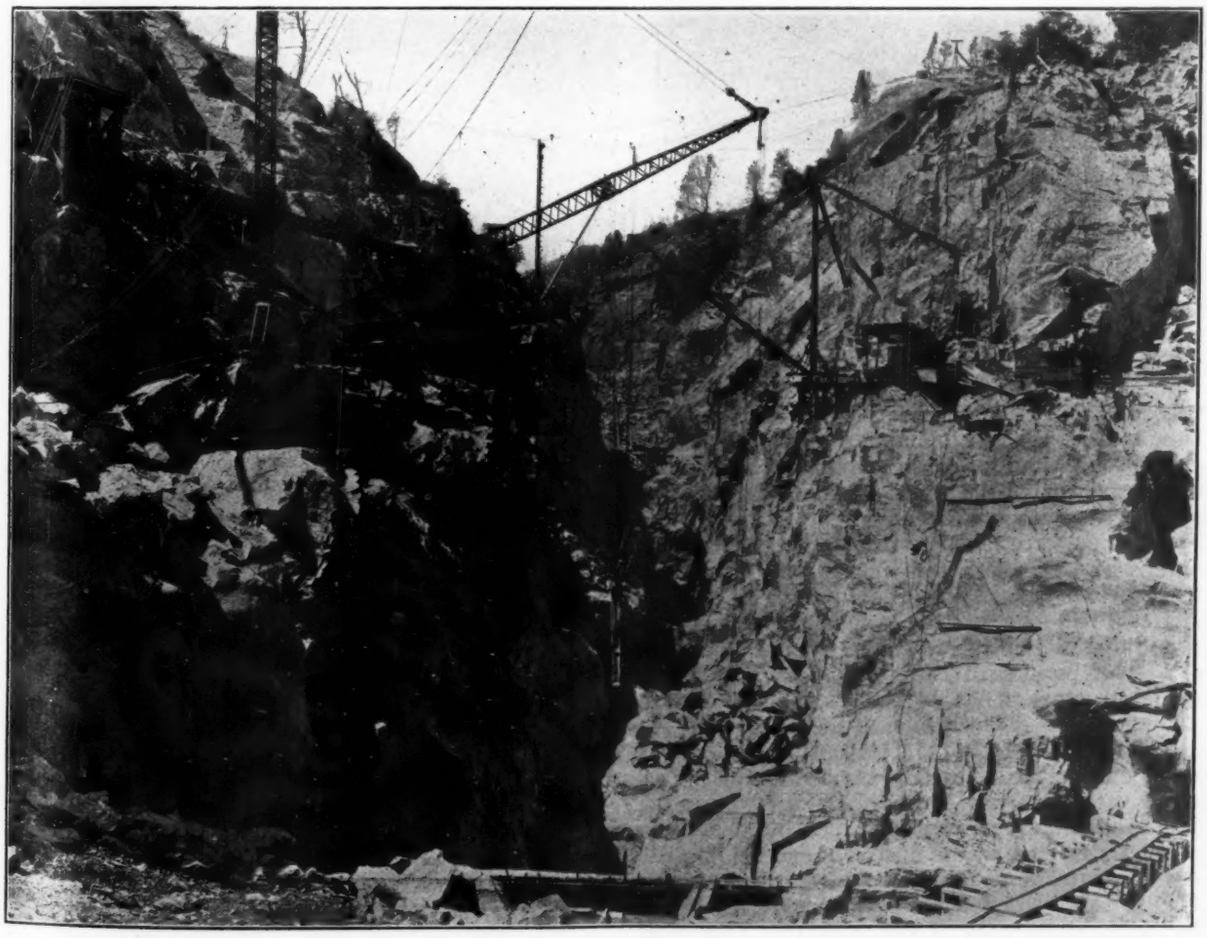
**145,000 yards of earth and rock in pit 117 feet deep handled, to a depth of 67 feet, by steam shovels and dump cars hauled up 20 per cent grade. Rock surfaces sand blasted. Men lowered 500 feet to bottom of pit in cableway skip.***

The Hetch Hetchy dam now being constructed to impound the run-off from a water shed of 459 square miles in the Sierra Nevadas and store it for the water supply of San Francisco is built across a very narrow portion of the granite rock canyon in which the Tuolumne river flows, about 3,500 feet above sea level. The sides of the canyon are very precipitous and, like the bottom of the canyon, are composed of very hard rock which is especially well adapted to support the dam and resist the ultimate hydraulic pressure of more than 300 feet head, especially because the bed rock under the stream bed slopes upward in the downstream direction and the converging sides of the canyon are here very steep and very close together.

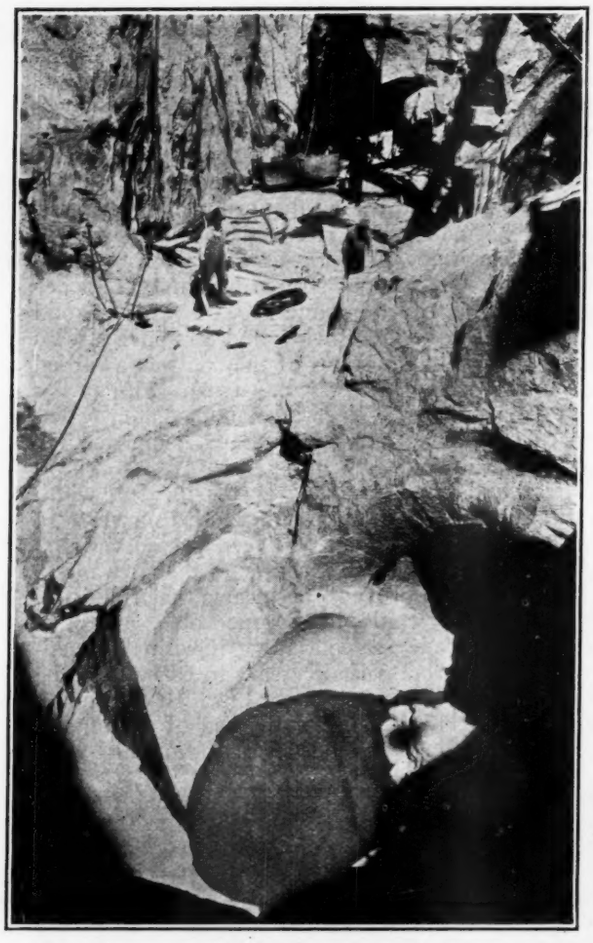
The dam has cyclopean concrete everywhere resting on sound, hard rock. To secure this involved the removal of loose and weathered portions on the sides of the canyon and the excavation through earth, loose rock and unsound strata to a maximum depth of 117 feet below the original bed of the river. The material so removed comprised 65,000 yards of earth and loose rock at a unit price of $8 when below the original stream bed and $1.50 per yard above that elevation, and 100,000 yards of solid rock at prices of $11.20 below and $3 above stream bed, according to the terms of the contract awarded by the city of San Francisco, August, 1919, to the Utah Construction Co., which immediately commenced operations and substantially completed the excavation in about 20 months.

The foundation, extending across the full width of the canyon with a maximum width transverse to the canyon of more than 300 feet, passed through surface material of such a character that it was anticipated it would prove so permeable that full depth open cut work would be impracticable, and provisions were made for continuing it with the pneumatic caisson process if necessary to carry it to the required depth below streambed, which eventually proved to be 117 feet below the bed of the stream and 146 feet below flood level. Materials were

* Article describing dam and river diversion work was published July 8th.



GENERAL VIEW OF EXCAVATION FOR HETCH HETCHY DAM, SHOWING DERRICKS INSTALLED FOR HANDLING ROCK FROM BOTTOM OF PIT, AND CHUTE FOR CONCRETING LOWEST PART OF FOUNDATIONS.



POT HOLE ENCOUNTERED IN EXCAVATION 100 FEET BELOW ORIGINAL STREAM BED.

therefore delivered in advance to the dam site for the construction of the cutting edges of the pneumatic caissons, but it was not found necessary to use them. Completion of the work by open excavation was made possible by the efficient provisions made for intercepting surface water, the existence of an impervious subterranean stratum which greatly reduced seepage into the pit, and the installation of a powerful pumping plant operating from high level and low level sumps and able at all times to care for all the water encountered with an ample excess of reserve capacity.

Great pains were taken to divert the river water by means of a crib dam with cut-off wall described in the previous article, and to deflect the flow to a tunnel, 900 feet long, passing around one end of the dam and discharging into the river channel just below a small permanent cofferdam consisting of a concrete structure about 46 feet long, 3 feet wide on top and about 23 feet wide at the bottom which was built to a height of 35 feet in a trench excavated in the rock 10 feet below the bed of the river. The top of the dam was 23 feet above water level, at which level the structure was pierced by a 30-inch horizontal pipe open at the upstream end and closed at the downstream end by a movable casting.

The stream diversion dam was made nearly at right angles to the axis of the permanent dam, the near point being about 100 feet from the latter, so that the side of the pit of the permanent dam was allowed to take a natural slope towards the diversion dam until excavation reached a depth of 53 feet below the foundations of the diversion dam, when it was assumed that a deeper slope might produce instability of the diversion dam.

A slope of about ½ to 1, blanketed with course material, was thus maintained until the excavation reached a depth of about 60 feet, and to prevent increasing the angle of the slope, the bank was retained by the construction of a concrete wall about 150 feet long and 35 feet high built in a timbered trench approximately parallel to the axis of the main dam. This wall was for retaining the material above, but the foundation was not made watertight. But although the excavation was carried below the bottom of this retaining wall and considerable seepage occurred through the coarse material below it, no serious difficulty resulted, and

DOWN-STREAM RETAINING WALL. 12-INCH BYRON JACKSON PUMP INSTALLED ON BARGE.

settlement of the wall was prevented by breasting the lower 27 feet of the excavation at this point.

Excavation was started on both sides of the canyon at the ends and top of dam, and slopes cleaned down to river bed. Drilling was all done with Ingersoll-Rand jackhammers, air for which was furnished by two Sullivan cross compound com-

pressors of 1,000 and 2,000 feet capacity. All excavated material was handled at stream bed level with a Marion 36 crawler shovel which loaded 4-yard 36-inch gage Western dump cars, hauled by 18-ton Porter dinkey engines. As excavation was carried below the stream bed, trains were worked on inclines, increasing to a maximum of 20 per cent. slope, which was double tracked, empty trains going down helping loaded trains out by use of a cable rove through a sheave on the dump above. Excavation was carried in this way 60 feet below stream bed, at which time the walls were narrowing so that the steam shovel had to be taken out.

Usually the shovel worked 10 feet deep on each side of the canyon. The steepness of the canyon walls was so great as to make the work slow and the danger from falling rocks prevented men from working at more than one level simultaneously. The scaling gangs above the shovel were alternated from side to side of the canyon so as to work when the shovel was on the opposite side.

Spoil from the lowest 57 feet was loaded by hand into 4-yard skips and hoisted with two 100-foot steel Insley and two 56-foot wooden derricks and 2-yard skips dumped into cars on tracks, located 40 feet above stream bed on either side of the canyon, which handled about 20,000 yards of rock.

The service track on which the spoil was carried to a dump in the river valley below the dam continued to the crusher plant and delivered broken stone for concrete in the later stages of the work.

As the excavation proceeded, the seams in the rock were thoroughly cleaned out to their full depth and the extremely irregular surface so formed provided excellent anchorage for the mass concrete. Notwithstanding the superficial fissures, the body of the rock was so sound and tight that no percolation or leakage came from the high-level diversion tunnel which was only a few feet from the excavation and it was found unnecessary to do any grouting.

Although the rock of the canyon was remarkably sound and solid, nearly all of the surface above stream level was removed. Below the level of the river bed, where the rock had not weathered much, less surface trimming was required. Loose sand and dirt were removed by washing and wire brushes and the smooth, waterworn surfaces of the rock were dressed by the sand blast which removed the shale and soft pits and provided a roughened surface affording better adhesion of the concrete.

A cut-off trench, 15 feet wide and 20 feet deep at the bottom, was run from end to end of the dam across the river bed and up both sides of the canyon walls in a line parallel to, and about 20 feet below the upstream face of the dam.

The excavation was carried on in three 8-hour shifts. Illumination was furnished at night by 1,000-watt electric lights suspended about 75 feet above the river bed. Much of the work, however, was of such difficult or hazardous character that it was only done in the day shift.

CUT-OFF TRENCH AND PART OF SOUTH ABUTMENT.

## Thomas J. Wasser, President A. R. B. A.

Thomas J. Wasser, whose election to the presidency of the American Road Builders Association was noted last week, has had an experience of thirty-two years in general construction, railroad and highway work. In 1892, at the age of 21, he began work on macadam highway construction with B. M. & J. F. Shanley, general contractors. During the next few years he served with the Long Island Railroad, the Consolidated Traction Co. of Jersey City, the Sanford & Stillman Co., general contractors, and spent 1899 to 1903 with Robert W. Hunt & Co., engineers. In 1903 he was appointed to assume charge of preliminary work for the Hackensack bridge and Newark plank road, and later was placed in charge of this construction. He also directed the construction of the 14th St. viaduct in Hoboken.

Mr. Wasser became engineer of Hudson county in 1913 and designed and constructed most of the Newark turnpike. In 1920 he was selected by the reorganized State Highway Commission to be state highway engineer of New Jersey. In addition to membership in a number of the national engineering societies, he is president of the New Jersey Board of Professional Engineers and Surveyors.

# Engineer's Plans for State Health Boards

**Oklahoma**—Plans are required in duplicate in general, as in the Arkansas regulations, but without specifying sizes of maps or plans; but specifications and engineer's report are to be on letter size paper, 8½x11 inches, with one-inch margins, firmly bound together at left margin. Further variations from the Arkansas regulations are as follows: For Water Supplies—Map need not show elevations of street intersections. Plan of purification works must show numbered contour lines. Quantities with unit prices are not required in the estimate. In the engineer's report discussion is asked of character of foundations for dams, loss from reservoir by seepage, and rainfall data. Also, if wells are to be used, "location of same relative to each other and to houses, sewers and other possible sources of pollution"; whether appliances to be used in purification plants are patented; same by-pass requirement as Louisiana (Public Works for May 27).

For Sewerage Systems—Profile scales suggested, vertically 10 feet to 1 inch; horizontally 100 feet to 1 inch. Plans of disposal works shall show contour lines and cross-sections of ground on which portions to be constructed are located.

**Pennsylvania**—The department has not adopted detailed requirements as to sizes and scales of plans, "realizing that if requirements are made very definite it may work a hardship on designing engineers by interference with their individual office standards. Our requirements, in fact, are most general, being simply that the plans be of a size which can be conveniently handled, contain a proper title, and that the drawings be of such scales as can be easily read."

**Rhode Island**—The board has advisory control only. It attempts to have plans filed with it, but has formulated no rules as to size or other details.

**South Carolina**—The Sanitary Engineering Department is new and has not yet adopted regulations as to plans, but expects to do so, asking for map, giving contours or street elevations in case of sewerage systems, lines of water mains or sewers, with size, and elevations of sewer inverts at manholes if profiles are not submitted; detail plans of all works, and complete engineer's report giving basis of design, estimates of future increase of population and any such other information as may be deemed necessary.

**Tennessee**—The Division of Sanitary Engineering was organized July 1, 1921, and has not yet established standard sizes or scales for maps and plans, although considering it. Its rules require, in duplicate, "complete plans and specifications," to include, for water supplies, "a description of the source of supply with information as to possible sources and extent of pollution; also of the intake, method of purification and distribution system. Plans for sewerage shall include the sewer system and disposal plant, information regarding the stream into which the effluent is to be discharged, and shall be sufficiently extensive to serve the whole community that may become tributary to the system, and also to allow for reasonable growth and development. This latter, however, does not necessarily contemplate construction of the complete system at one time." There must be submitted "results of complete chemical and bacteriological analyses, made by an analyst approved by the State Board of Health, or a sample or samples of water taken from the source or sources of supply."

**Texas**—*Water Supply.* There are required a general map showing the main features of the system with relation to each other and to the district served—impounding reservoirs, intakes, purification works, pumping plants, pipe lines, etc.; boundaries of watershed areas, principal sources of possible contamination of the supply. Map must not exceed 36 inches in either length or width, and have binding border of at least 2 inches at left edge.

If necessary, because of the small scale of the general map, a map to large scale is required showing all streets with accurate location of mains, fire hydrants, valves, etc., sizes and materials being definitely indicated, and any features of the system within the confines of the map being shown. Drawings are required showing details of construction at sources of supply such as dams, contour map of reservoir, area where wells are located showing location of cesspools or other possible sources of contamination and proposed protection against pollution; plan of pumping station showing kind and capacity of equipment; plans of reservoirs or tanks, and of purification works showing general layout of the various units, with detail drawings giving longitudinal and transverse sections, distributing, cleaning and draining facilities, automatic regulating devices and means for handling chemicals. "Specifications and estimates of cost must cover all items and be complete in all respects."

The engineer's report shall be on letterhead size sheets, typewritten and firmly bound together. It should discuss fully all factors bearing on the purity, impairment and purification of the supply. Headings suggested for the report are: Population studies, consumption statistics, development of supply, watersheds, lakes and large reservoirs, wells, tunnels and springs, reservoirs and basins, filtration, softening works, disinfection, pumping stations, weirs and measuring devices, by-pass arrangements, instructions for operating ("What is the period of retainer for engineering supervision of operation?"), distribution system.

*Sewerage.* The regulations are the same as for Arkansas, with the following exceptions: On the map, contour lines are to be at intervals of not more than 5 feet. For profiles, horizontal scale 100 feet to 1 inch; plans under profiles showing Y connections, etc., not called for. Plans for weir and disinfecting plant at disposal works not called for. In sizes of drawings suggested, a length of 60 inches is added.

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## Underground Uncertainties

City engineers and other public works officials do not often pay much attention to the geology of the territory in which their work is located, beyond learning whether sewer trenches will encounter rock or quicksand, or possibly whether water can be obtained by wells and at what depth. And yet such knowledge often is very desirable.

One of the most important applications of a knowledge of the strata underlying a city is the possibility thus afforded of foreseeing movements of the ground that are likely to occur if the existing equilibrium is disturbed by excavation or by imposing additional loads. A famous illustration of such disturbed equilibrium is the Culebra cut, where the engineers foresaw the great probability that the making of this cut would result in a sliding of the hill upon the sloping clay stratum, but saw no way to prevent it. The writer remembers seeing similar slides on a much smaller seale during the widening of the Erie Canal several years ago.

It is when these slides occur in a city that they become most serious. A well-known illustration is the Bigelow Boulevard in Pittsburgh, restoration work on which was described in our July 8th issue. Other streets in that city have been sliding for years; we remember seeing one thirty years ago that had a bend of several feet out of its original straight line caused by a slight slipping of the soil to a depth of twenty or thirty feet.

Another illustration of the same phenomenon is apparently taking place in Detroit. In the 1921 report of the water commissioners of that city one of the commissioners, Alex. Dow, gives reasons for believing that a blue clay know locally as "soft blue" has the faculty of yielding water and so contracting under pressure and of absorbing it and swelling when the pressure is removed, and of horizontal movement under unbalanced pressures; and that under the effects of excavating and of imposing enormous weights of buildings this clay does move horizontally and carries the ground above with it. The movements are slow and comparatively slight, but they are thought to be the cause of a movement of the survey monuments in some parts of the city from year to year, and of the breaking of water mains in some instances.

Other characteristics of this blue clay in Detroit occasionally demonstrate their importance. A contractor building a sewer in this clay placed the excavated materials on the banks of the trench and the weight of it caused the bottom of the trench to rise and the banks outside the sheathing to settle correspondingly. Unfortunately this movement was not noticed until after the sewer had been laid, and removing of the overburden and relaying was necessary. Another peculiar incident illustrated how good a conductor of vibrations this blue clay is. Two large engines resting upon this clay, when run at 145 revolutions a minute caused dangerous vibration in a bank building three blocks away but in no intervening building; and when they were speeded up a very little faster the vibrations in the bank ceased, indicating that 145 vibrations a minute happened to harmonize with the vibration period of that particular building, as well as that the clay conducted appreciable vibrations of the pumps more than a quarter of a mile.

## Increased Salaries for Sanitary Engineers

The salaries paid to the engineers of the Public Health Service in the past have not been such as to retain in the service the high grade of men that the richest government in the world should have in its employ, and it must be due to other attractions of the service that such good men have been found in it for even short periods of time. Some improvement in this respect has been made possible by Congress, however, and increases in salaries became effective July 1 of this year.

Announcement has just been made of competitive examinations for assistant sanitary engineers and junior assistant sanitary engineers in the Public Health Service, at salaries of $3,225 and $2,320 respectively; the former carrying an increase of $600 and the latter of $420, both effective July 1. After twelve years of service, officers in the P. H. S. will be entitled to examination for promotion to the position of associate sanitary engineer at a minimum salary of $3,920. When reaching the age of 70 years, those who have been 15 years in the service can retire on an annuity.

Candidates for the junior position must have

passed a four-year course in engineering, or four years in extra-collegiate study and four years of practical experience in sanitary engineering; also 12 months of post-graduate experience. Those for assistant engineer must have had two years of practical experience in addition to the above. The juniors must be between 21 and 30 years of age and the assistant engineers between 23 and 32.

For young men from one to three years out of college, the above salaries will probably prove attractive if they desire the experience obtainable in the Public Health Service. How long they will be willing to stay with no prospect beyond a salary of $3,920 (less 2½ per cent. annuity assessment) is another question.

Those who desire to take the examination for these positions should apply for information to the Civil Service Commission at Washington or the nearest local secretary of the Commission.

Many other U. S. Civil service positions are not so attractive as those just mentioned. We have received notice of examinations to be held August 9 and 10 for positions of computer with the U. S. Coast and Geodetic Society, the salary for which is $1,400 a year, with $240 additional granted by Congress to provide for present high cost of living. As the calculations made in connection with the work of the Coast and Geodetic Survey require the use of the most advanced mathematical theories and processes, the salary of $1,640 a year does not seem to be one to attract many who are competent to adequately perform such service.

## The Louisville Sewerage Controversy

The general features of a controversy between the contractors of Louisville, Ky., and vicinity and the sewer commissioners of that city were referred to in our issue of June 24th. We have learned that at about that date the contractors and commissioners came to an agreement, and the former have bid upon the work, having agreed to do so after recognition by the commission that the form of contract was faulty and with the understanding that the contractor could appeal to the commissioners from the decision of the engineer. In a statement explaining this decision the Kentucky Association of Highway Contractors said: "We are not confident yet that any commission or board can review a dispute without a natural and human leaning toward the views of its employees and in the present instance this can only be determined by trial. We have always had implicit confidence in the personality of the four citizens constituting the commission and in their desire to be strictly fair to the constructors." The secretary of the Kentucky Association of Highway Contractors, D. R. Lyman, in a letter sending us this information, expresses the opinion that only experience can determine whether this will prove to be a satisfactory solution.

## Manufacturing Ballast and Road Metal

In Mayotown, Texas, and at New Iberia, Louisiana, the Southwest Ballast Company of Houston, Texas, are carrying on a novel process for the manufacture of ballast for railroad tracks and foundation material for highways.

The rich black gumbo and plain soil is excavated, mixed with coal and burned in the open air, producing a hard, porous, brick-like material said to be superior to sand and gravel for ballast purposes. A traveler moving on a standard gauge track is equipped with a long horizontal transverse boom from which there is handled a dragline bucket that excavates a trench about 15 feet deep depositing the material in a long bank, where it is covered, layer by layer, with coal delivered on the same track in open-top cars, unloaded from them and spread on the successive layers of muck by another traveler with transverse boom and bucket. The construction of the pile of earth and coal is continued after the first layer of coal is lighted and the burning maintained until the vegetable matter in the soil is eliminated and a hard, red, porous substance produced that is said to absorb 700 pounds of water per cubic yard. This is excavated and loaded into open-top cars by means of a third traveler equipped with transverse boom and dragline bucket. The Texas plant is said to have constructed and burned an embankment more than 1¼ miles long in about nine months.

## Widening Rock Tunnels in Service with Sectional Shields

The conversion of a single track line of the Virginia Railway to double track involved the widening of five tunnels having an average length of over 11,000 feet, which was executed without materially interfering with traffic by W. W. Boxley & Co., Roanoke, Va., under the direction of engineer H. Fernstrom. The tunnels were located chiefly in shale or hard rock with slate and coal seams, and required to be widened 2 feet on one side and 18 feet on the other side and to be made higher to give a 21½-foot clearance above the rail and to accommodate a new lining 26 inches in minimum thickness, all of which involved the excavation of about 13 yards of material in the heading and 9½ yards per linear foot in the bench, amounting to a total of 250,000 yards.

During construction traffic was protected by a movable shield 60 feet long, in 4-foot sections, each consisting of two steel arch ribs of 16½-foot span over all, each supported at each end on an integral vertical steel column 14½ feet high, connected together 4 feet apart longitudinally by horizontal 4x8-inch lagging planks.

The heading, which was maintained 12 feet behind the forward end of the shield, was excavated for the full length of the tunnel and the muck loaded into narrow guage cars operated on a service track on the bench. The 12x12-inch timbering was set up as the heading advanced, and the sections of the shields were moved forward and erected by a flat car with a hand derrick.

After the heading and timbering had been completed, the bench was blasted and mucked with a steam shovel that loaded it into cars on the main line. The rock was drilled with from 4 to 6 jack hammer type drills in each heading. Progress was slow, sometimes being not more than 1 linear foot per day.

# Recent Legal Decisions

### ASSESSING RAILROAD PROPERTY RUNNING THROUGH STREETS

A city may charge a railroad's property which abuts, fronts or borders on the side of the street with its proportionate part of the expense of paving the street upon which such property abuts, fronts, or borders; but where a railroad whose tracks run longitudinally through the centre of a street has been assessed the cost of paving between the rails of its track and for two feet on either side, it cannot be further assessed the cost of paving the street.—Atlantic Coast Line R. Co.v. City of Gainesville, Florida, Supreme Court, 91 So. 118.

### CONSTRUCTION OF STATUTE PROVIDING FOR IMPROVEMENT CONTRACTS BASED ON ESTIMATES OF CITY ENGINEERS

Section 5011 of the Nebraska Revised Statutes of 1913 requires that no improvement contract of a city of the second class shall be let for a price in excess of the city engineer's estimate. The Nebraska Supreme Court holds, State ex rel City of McCook, 187 N. W. 84, that where the engineer of such a city submits to the city council in writing an estimate of the cost of a paving improvement, based upon the unit plan, and also based upon the then existing freight rates upon the materials to be used, which estimate is supplemented by a verbal report to the city council that, if the freight rates on the materials to be used should be advanced, his estimate of the cost should be correspondingly increased, and where the city council enters into a contract with a person to do such paving for the unit prices named in such estimate, which contract contains a stipulation that, if the freight rates upon the materials used should be advanced, the cost should be correspondingly increased, and, if lowered, correspondingly decreased, such contract is a compliance with the section. This section does not require that the city council should, before letting a contract, advertise for bids and let the contract to the lowest responsible bidder on competitive bidding.

### CONTRACT FOR ELECTRICITY PENDING VOTE ON PURCHASE OF PLANTS HELD VALID

The California Supreme Court holds, Los Angeles Gas & Electric Corp. v. City of Los Angeles, 205 Pac. 125, that the city did not violate Section 2 subd. 41 and section 191 of the city charter, prohibiting the sale of electricity at wholesale, by entering into a contract with light and power companies in anticipation of a purchase of their distributing systems, although the companies distributed the electricity of the city and collected the charges therefor, retaining a certain percentage of the value of the property of the companies used in the distribution of electricity as compensation, pending a vote on a bond issue to be used to purchase the companies' properties, the city receiving the surplus. Such an arrangement is not a contract required to be let only after advertisement and to the lowest bidder. The power to be supplied by the companies could not be obtained elsewhere, and was furnished by public service corporations for distribution to consumers already entitled to that service.

### CONSTITUTIONAL GRANT OF POWER TO TAXPAYERS TO CREATE DEBT TO ACQUIRE PUBLIC UTILITY HELD SELF-EXECUTING

The Oklahoma Supreme Court holds, Williams v. City of Norman, 205 Pac. 144, that section 27, art. 10, of the Oklahoma Constitution, is a self-executing grant of power to the qualified property taxpaying voters of a city or town voting at an election held for that purpose, by a majority vote, to become indebted in a larger amount than that specified in sections 9 and 26, art. 10, of the Constitution, for the purpose of purchasing or constructing public utilities, or for repairing the same, to be owned exclusively by such city. Electric light plants, sewers and waterworks are held "public utilities" within the meaning of the term as used in section 27. The section is complete in itself, and needs no further legislation to put it in force. That part of the section providing that "any incorporated city or town in this state may, by a majority of the qualified property taxpaying voters of such city or town, voting at an election held for that purpose," means a majority of such voters voting, in contradistinction to "a majority of such voters in such city or town."

### CONSTRUCTION OF CONTRACT TO PAY FOR PAVING MATERIAL FROM PROCEEDS OF TAX BILLS

A contract between paving contractors and parties furnishing certain paving materials, and other parties agreeing to pay for work and materials, provided that the parties furnishing the material should wait until the entire job was finished, but further provided that payment was to be made out of the proceeds of tax bills to be given the contractors, the contractors to be given a reasonable time, not exceeding six months, to sell the tax bills. The Missouri Supreme Court, Kansas City ex rel. Barrett Co. v. Spitcaufsky, 239 S. W. 808, construes this contract to mean that, if in advance of issuance of the tax bills the contractors had made such a disposition of them as showed they did not intend to pay for the material out of the proceeds of their sale, or which rendered them unable to do so, the materialman's claim would have become due on the completion of the work for the city. And if such a disposition of the tax bills had been made after their delivery, the materialman's debt would thereupon have become immediately due and payable.

### POLICE POWER OF STATE TO LICENSE FUTURE USE OF WATER BY CITY

The New Jersey Court of Errors and Appeals, in State v. City of Trenton, 117 Atl. 158, has sustained, as being within the police power of the State to conserve public property, the New Jersey Act of June 17, 1907 (P. L. p. 633), imposing a reasonable license fee on cities for taking water in the future from a river in excess of the amount it was then using if such diversion shall be in excess of 100 gallons daily per capita as shown by the census of 1905.

# USE OF METERS AND CHECK VALVES

**Continuation, from the May 13th issue, of tables prepared from data furnished by superintendents of nearly eight hundred cities.**

| Municipality | Can their use be legally required? | Are check valves used at meters? | Have check valves damaged kitchen boilers or house piping? | Size of meters for ordinary residences |
|---|---|---|---|---|
| **Pennsylvania:** | | | | |
| Ambler | .... | yes | no | ⅝" |
| Beaver | in case of waste | no | yes | ⅝" |
| Bradford | .... | no | ..... | ..... |
| Clearfield | yes | no | no | ⅝" x ¾" |
| Elizabethtown | .... | no | ..... | ⅝" |
| Knoxville | yes | no | ..... | ¾" |
| Lebanon | yes | large meters only | no | ⅝"-¾" |
| Parkesburg | Pub. Serv. Com. does | no | no | ⅝" |
| Rankin | yes | no | ..... | ⅝" |
| Ridgway | yes | no | ..... | ⅝" |
| Sewickley | no | no | no | ⅝" |
| Tarentum | .... | no | no | ⅝" |
| Waynesboro | yes | ..... | ..... | ..... |
| West Newton | yes | no | ..... | ½" x ¾" |
| **Rhode Island:** | | | | |
| Narragansett Pier, Wakefield, Peace Dale | .... | no | no | ⅝" |
| Phenix | no | in some cases | use safety valve | ⅝"-¾" |
| Providence | no | not generally | no | ⅝" x ¾" |
| **South Carolina:** | | | | |
| Chester | yes | no | ..... | ⅝" |
| Sumter | all metered | where large boilers | no | ½"-¾" a few 1" x 1½" |
| **South Dakota:** | | | | |
| Rapid City | yes | only on steam boiler | ..... | ⅝" |
| Watertown | yes | no | ..... | ⅝" |
| Yankton | yes | on steam plants and range boilers | no | ⅝" |
| **Tennessee:** | | | | |
| Clarksville | yes | where serv. connected to boilers, heaters, etc. | ..... | ⅝"-¾" |
| Covington | yes | ..... | ..... | ..... |
| Dyersburg | yes | no | ..... | ⅛", ¾" connec'ns |
| Fayetteville | .... | no | no | ½" |
| Jackson | yes | yes | no | ..... |
| Johnson City | no | no | ..... | ⅝" |

| Municipality | Can their use be legally required? | Are check valves used at meters? | Have check valves damaged kitchen boilers or house piping? | Size of meters for ordinary residences |
|---|---|---|---|---|
| **Texas:** | | | | |
| Bryan | .... | no | ..... | ⅝", ¾" connec'ns |
| Childress | yes | no | no | ⅝"x¾" |
| Clarksville | yes | no | no | ⅝" |
| Corpus Christi | yes | no | ..... | ⅝"x¾" |
| Del Rio | no | no | no | ⅝" |
| Eastland | yes | no | no | ¾"x⅝" |
| Galveston | yes | in some cases | no | ⅝" |
| Georgetown | yes | no | ..... | ⅝" |
| Gonzales | yes | flat rate | ..... | ..... |
| Gorman | yes | no | ..... | ⅝"x¾" |
| Greenville | yes | all meters have cut off | check valves used on boiler conn. | ⅝" |
| Longview | yes | no | ..... | ¾"x⅝" |
| McKinney | city charter | no | ..... | ⅝" |
| Navasota | no | no | ..... | ⅝"x"⅜ |
| Orange | yes | no | ..... | ⅝" |
| Weatherford | .... | no | ..... | ⅝" |
| **Utah:** | | | | |
| Brigham | city has jurisdic'n | yes | no | ⅝" |
| **Vermont:** | | | | |
| Bennington | no | no | ..... | ⅝" |
| Brattleboro | at option of Co. | yes | no | ⅝" |
| **Washington:** | | | | |
| Aberdeen | yes | yes | no | ⅝" and ¾" |
| Anacortes | yes | yes | no | ⅝", ½" spuds |
| Auburn | yes | where necessary | no | ⅝"x¾" |
| Bellingham | no | yes | no | ¾" |
| Cle Elum | rests with council | no | no | ½"-"⅝ |
| Dayton | yes | no | ..... | ⅝", ½" or ¾" connections |
| Ellensburg | no | no | ..... | ..... |
| Hoquiam | yes | no | very little | ⅝", ¾" connec'ns |
| Port Angeles | no | no | ..... | ⅝" |
| Snohomish | yes | where hot water can come back | no | ¾" |
| Tacoma | .... | only where trouble from boiler water | no | ⅝" and ¾" |
| Walla Walla | yes | ..... | no | ¾",, ⅝" connec'ns |

## Table III—Water Works Service

| Municipality. | Private (P.) or municipal (M) plant. | Services laid preparatory to paving, before needed for use. Are they required by city? | Kind of pipe specified. | Depth specified. | Trouble experienced with them after laying. |
|---|---|---|---|---|---|
| **Arizona:** | | | | | |
| Clifton | P. | no pav. | .... | 2 ft. | ..... |
| Douglas | M. | yes | l. | 2½-3 ft. | none |
| Glendale | M. | no | not specified | deep enough to clear plow | none |
| Nogales | M. | no | .... | .... | ..... |
| Prescott | M. | yes | ¾" | 2 ft. | none |
| Tucson | M. | yes | l. | 2 ft. | one or 2 sand holes |

| Municipality. | Private (P.) or municipal (M) plant. | Services laid preparatory to paving, before needed for use. Are they required by city? | Kind of pipe specified. | Depth specified. | Trouble experienced with them after laying. |
|---|---|---|---|---|---|
| **Idaho**—Continued | | | | | |
| Preston | M. | yes | g., l. gooseneck | 4 ft. | none |
| Weiser | M. | yes | l. | 42" | none |
| **Illinois:** | | | | | |
| Hinsdale | M. | yes | l. | 4 ft. | found stopped up |
| White Hall | M. | no pav. | .... | 30 in. | ..... |

| | | | | | |
|---|---|---|---|---|---|
| **Arkansas:** | | | | | |
| | | | 1 ft. below ll., only where gas- | | |
| **Indiana:** | | | | | |
| Franklin | P. | no | wi. generally used | 30 in. | ..... |

| | | | | | |
|---|---|---|---|---|---|
| **Arkansas:** | | | | | |
| Helena | P. | yes | l. | 1 ft. below con. base of pro. pave. | ll., only where gasket depreciates and blows out on nut and tail piece connection on wiped joint connections |
| Russellville | P. | no | .... | .... | ..... |
| **California:** | | | | | |
| Anaheim | M. | yes | g. | 24-30 in. | ..... |
| Benecia | P. | no | none | no spec. | none |
| Burbank | M. | no | .... | 18 in. | ..... |
| Calexico | M. | yes | none | 3 ft. | none |
| Daly City | M. | yes | ¾" pipe & curb cock | 2 ft. | none |
| Dinuba | M. | no | .... | .... | ..... |
| El Centro | M. | yes | l., cross fitting | 2 ft. | none |
| Fort Bragg | ... | no | ... | no spec. | ..... |
| Fullerton | M. | yes | l. | 18 in.-2 ft. | rusting out |
| Monterey, Pacific Grove, Carmel, Pebble Beach | P. | no | .... | .... | ..... |
| National City | P. | optional with co. | .... | 1-2 ft. | ..... |
| Needles | P. | no | .... | .... | ..... |
| Oxnard | M. | yes | none | 2 ft. | none |
| Palo Alto | M. | practice abandoned | 3¼" wi. | 18-24" | idle serv. deteriorates more quickly than used |
| Red Bluff | M. | yes | g., wi. | 2 ft. | none |
| Redding | P. | no | .... | 2 ft. | none |
| Salinas | P. | no | no spec. | no spec. | on cert. st. 12 serv. leaked and were cut off before being used |
| San Fernando | M. | usually | ¾" wi. | 2 ft. 6 in. | rust after sev. yrs. |
| Santa Maria | M. | yes | ¾" wi. | 2 ft. | no more than expected |
| Santa Paula | P. | no | none | 18-30" | few caused by defective pipe |
| So. Pasadena | P. & M. | yes | ¾" g. | 30 in. | none |
| **Colorado:** | | | | | |
| Brighton | M. | yes | l. | 5 ft. | none |
| Delta | M. | no pav. | .... | 3½ ft. | ..... |
| Denver | M. | no | .... | 5 ft. | ..... |
| Montrose | M. | no | l. | 3 ft. 6 in. | none |
| Sterling | M. | yes | l. | 3½ ft. | none |
| **Connecticut:** | | | | | |
| New Brit in | M. | no | .... | .... | ..... |
| New London | M. | sometime | l., ci. or br ss | 4½ ft. | none |
| **Florida:** | | | | | |
| De Land | .. | yes | l. | 2 ft. | none |
| Ft. Myers | M. | yes | 2 ft. l., rest wi. | 2 ft. | none |
| Lakeland | M. | no | .... | 12"-18" | none |
| Quincy | M. | yes | g., l. gooseneck | 2 ft. | rust and corrode |
| **Georgia:** | | | | | |
| Cedartown | M. | no | .... | 18" | none |
| Newnan | M. | yes | non ; use g. | 12"-18" | none |
| **Idaho:** | | | | | |
| Blackfoot | M. | no | .... | 4 ft. | none |
| Burley | M. | no | .... | 3 ft. | none |
| Caldwell | M. | yes | g. | 3 ft. | none |
| Coeur d'Alene | P. | no | ¾" | 4 ft. | occasional freeze up |
| Lewiston | M. | yes | gwl. | 4½ ft. | l. gooseneck bursting because of poor workmanship |
| Montpelier | M. | yes | ¾" residence up to 2" | 4½ ft. | some from freezing |
| **Indiana:** | | | | | |
| Franklin | P. | no | wi. generally used | 30 in. | ..... |
| Portland | M. | yes | l. | 3 ft. | none |
| Princeton | P. | yes | no spec. | 3 ft. | none |
| Richmond | P. | yes | l. | 4½ ft. | ..... |
| Rushville | M. | yes | ll. | 3 ft | very little |
| Seymour | P. | ... | .... | 3½ ft. | none from frost |
| Shelbyville | P. | no | .... | .... | ..... |
| **Iowa:** | | | | | |
| Albia | M. | yes | l. | 4-4½ ft. | 2 cases of freezing |
| Cedar Falls | M. | yes | wi. | 5½ ft. | ..... |
| Charles City | M. | yes | l. | 6 ft. | seldom |
| Cherokee | M. | yes | l. | 6 ft. | practically none |
| Nevada | | yes | ¾" l. | 5 ft. | none |
| Newton | M. | yes | l. | 4½ ft. | none |
| Oskaloosa | P. | no | l. | 4 ft. | none |
| Winterset | | yes | gs. | 4 ft. | rusting and splitting in weld |
| **Kansas:** | | | | | |
| Augusta | M. | yes | l. | 30 in. | none |
| Baxter Springs | M. | yes | l. ⅝", ¾", 1" | 24-30 in. | freeze once in 10 yrs. |
| Concordia | M. | to lot line | ¾" | 3½ ft. | none |
| Council Grove | M. | no | .. | 3 ft. | none |
| Holton | M. | only when pavt. goes to sidewalk | l. | 3 ft. | none |
| Junction City | M. | no | .... | 4 ft. | ..... |
| Manhattan | M. | yes | l. or wi. | 3 ft. | very little |
| Pratt | M. | yes | .... | 3 ft. | none |
| **Kentucky:** | | | | | |
| Georgetown | P. | no | .... | .... | ..... |
| Hickman | P. | ... | none | 2 ft. | had to relay some |
| Hopkinsville | P. | no | .... | .... | ..... |
| Maysville | P. | ... | .... | 30" | none |
| Paris | P. | yes | ¾"-1" | 3 ft. | none |
| **Maine:** | | | | | |
| Calais | P. | no | .... | 4½-5 ft. | none |
| Gardiner | water dist. | no | .... | 5 ft. | ..... |
| Rockland | ... | no | .... | .... | ..... |
| Rumford | M. | no | .... | .... | ..... |
| **Maryland** | | | | | |
| Baltimore | M. | no | .... | .... | ..... |
| **Massachusetts:** | | | | | |
| Adams | ... | if necessary | ¾" | 5½ ft. | none |
| Dalton | M. | outside of sidewalk | g. | 5 ft. | ..... |
| E. Bridgewater | M. | ... | .... | .... | ..... |
| Falmouth | M. | no | .... | .... | ..... |
| Fitchburg | M. | no | .... | 6 ft. | ..... |
| Lynn | M. | no | .... | .... | ..... |
| Millbury | P. | no | .... | .... | ..... |
| Shrewsbury | M. | no | .... | 5 ft. | ..... |
| **Michigan:** | | | | | |
| Coldwater | ... | yes | l. | 5 ft. | none |
| Grand Rapids | M. | yes | l. up to 1" | 5¼ ft. | none |
| Hancock | M. | no | .... | 4' 6" | frost when ground not covered enough with snow |
| Iron Mountain | P. | no | .... | 7 ft. | ..... |
| Royal Oak | M. | yes | gwl. | 4 ft. | none |
| St. Joseph | M. | yes | l. | 3½ ft. | only where elec. cars |
| **Minnesota:** | | | | | |
| Alexandria | M. | yes | l. & wi. | 8 ft. | none |
| Fairmont | M. | yes | l. | 4-5 ft. | none |
| Litchfield | M. | no | l. | 7' 6" | none |
| Moorhead | M. | yes | l. | 6 ft. | none |
| New Ulm | M. | yes | ⅝" l. | 8 ft. | none |
| St. Peter | M. | no | .... | .... | ..... |

*(To be continued)*

# NEWS OF THE SOCIETIES

## CALENDAR

**July 18, 19, 20**—STEEL METAL CONTRACTORS' ASSOCIATION OF OHIO. Annual convention. Zanesville, Ohio. L. W. Henslee, chairman, convention committee, 623 Putnam Ave., Zanesville, Ohio.

**July 19-21**—MICHIGAN STATE ASSOCIATION, NATIONAL ASSOCIATION STATIONARY ENGINEERS. Annual convention. Masonic Temple, Kalamazoo, Mich. Secretary, E. C. Smith, 208 W. Vine St., Kalamazoo, Mich.

**July 27-28**—SHEET METAL CONTRACTORS' ASSOCIATION OF PENNSYLVANIA. Convention. Hotel Lawrence, Erie, Pa. Secretary, W. F. Angermeyer, 714 Homewood Ave., Pittsburgh, Pa.

**July 26-28**—WISCONSIN STATE ASSOCIATION, NATIONAL ASSOCIATION OF STATIONARY ENGINEERS. Convention and mechanical exhibit. Capitol Building, Madison, Wis. Chairman, convention committee, J. J. Novotny, 2133 Fox Ave., Madison, Wis.

**Aug. 15-17**—LEAGUE OF IOWA MUNICIPALITIES. Annual meeting. Secretary, F. G. Pierce, Marshalltown, Ia.

**Aug. 15-18**—INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Fiftieth convention. Municipal Auditorium, San Francisco, Cal. Secretary, James J. Mulcahey, Chief, Yonkers, N. Y., Fire Dept.

**Aug. 28-Sept. 2**—NATIONAL SAFETY CONGRESS. Detroit, Mich.

**Sept. 11-15**—ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS. New Auditorium, Cleveland, Ohio.

**Sept. 12-15**—NEW ENGLAND WATER WORKS ASSOCIATION. 41st annual convention. New Bedford, Mass. Secretary, Frank J. Gifford, Tremont Temple, Boston, Mass.

**Sept. 14-16**—AMERICAN ASSOCIATION OF PORT AUTHORITIES. Convention at Toronto. Secretary, M. P. Fennell, Jr., Montreal.

**Sept. 25-28**—SOUTHWEST WATER WORKS ASSOCIATION. Annual convention. Hot Springs, Ark.

**Oct. 1-6**—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention. Cleveland, Ohio.

**Oct. 16-19** — AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting. Clevelnd, Ohio.

**Nov. 15-16**—NATIONAL INDUSTRIAL LEAGUE. Annual meeting. New York City. Secretary, J. H. Beck, Chicago.

**Dec. 7-13**—NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING. New York City.

## PROVIDENCE ENGINEERING SOCIETY

At a recent meeting the following officers were elected: President, Professor J. A. Hall; Vice-Presidents F. C. Freeman, R. W. Eaton, F. W. Bliss; Secretary, J. T. Barnicoat; Treasurer, A. E. Thomley; Librarian, E. E. Baker; Chairman of Publication Committee, F. R. Inman; Councillors, J. R. K. Lyons, W. C. Slade, E. E. Nelson and George Squibbs.

## SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION

Several papers of interest were read at the annual convention of this cociety held at Urbana, Illinois, June 20th. Some of these were: "Cultural Element in Engineering Education," by W. H. Rayner of the University of Illinois; "Some Problems in Engineering Education," by J. H. Dunlap of the Iowa State University; "Teaching," by Charles E. Chadsey of the University of Illinois.

The following were elected to office: President, Charles F. Scott, of Yale University; Vice-Presidents, D. S. Kimball of Cornell and F. G. Higbie of Iowa; Council Members, M. W. Alexander, National Industrial Conference Board; Edward Bennett of Wisconsin, H. S. Evans of Colorado, E. A. Hitchcock of Ohio, H. J. Hughes of Harvard, C. E. Magnussen of Washington and G. C. Shadd of Kansas State.

## AMERICAN SCCIETY FOR TESTING MATERIALS

The opening session of the annual meeting at Atlantic City was devoted mainly to the discussion of the corrosion of iron and steel. A paper on that subject was presented by Professor W. D. Bancroft.

The results of the election were as follows: President, Dr. George K. Burgess, chief of the Division of Metallurgy of the U. S. Bureau of Standards; Vice-President, Dr. William H. Walker; Directors, D. M. Buck, Dr. W. K. Hatt, W. M. Corse and J. R. Onderdonk.

## WESTERN SOCIETY OF ENGINEERS

The annual meeting and dinner of this society held in Chicago was addressed by C. S. Richards, former dean of the college of engineering, University of Illinois, who spoke on the subject of training of engineers.

Officers for the new year were elected as follows. President, J. L. Hecht; Vice-Presidents, Frank F. Fowle, Charles A. Morse and E. T. Howson; Secretary, Edgar S. Nethercut; chairman of the several sections: bridge and structural, C. L. Post; electrical, F. E. Goodnow; gas, H. E. Bates; hydraulic, sanitary and municipal, P. E. Green; mechanical, Horace Carpenter; railway, H. G. Clark; telephone, telegraph and radio, Burke Smith.

## ASSOCIATED GENERAL CONTRACTORS OF AMERICA

At the Executive Board meeting, June 21, the application for a State Branch from the general contractors of North Carolina, with 35 charter members, was favorably voted on. The special committee on Concrete Specifications reported unfavorably on the suggestion of the chairman of the Joint Committee on Specifications for Concrete and Reinforced Concrete that tests should be made in various parts of the country by the contractors, and their opinion was sustatined by the Executive oBard. The committee was continued and authorized to prepare specifications for concrete and reinforced concrete.

## ASPHALT ASSOCIATION

At its recent annual convention in New York the following were elected to office: President, Joseph R. Draney, U. S. Asphalt Refining Co., New York; Vice-President, F. P. Allen, Standard Oil Co. of Indiana, Chicago, Illinois; Treasurer, Herbert Spencer, Standard Oil Co. of New Jersey, New York; Secretary, J. E. Pennybacker, New York.

Resolutions urging lower freight rates on road materials and equipment, increases in compensation for competent engineers, and open competition between all types of paving construction. A protest was made against the proposed limitation of Federal Aid funds for highway construction.

## PORT AUTHORITIES

The convention of the American Association of Port Authorities will be held in Toronto, Canada, on September 14th, 15th and 16th and will be followed by an excursion down the St. Lawrence River through the Thousand Islands to Montreal, where an opportunity will be given to see the terminal facilities of this great port, after which the excursion will be continued down the river to Quebec, where the Harbor Commission will receive the members of the association and their guests and exhibit their harbor and its terminal facilities.

# PERSONALS

Foreman, Charles S., has been promoted from assistant chief engineer of the Kansas City water department to the position of superintendent.

Wertz, Leroy F., formerly assistant chief engineer of maintenance of the State Highway Department of Indiana, is now chief of the division of auditing and succeeds John D. Williams, now director of the State Highway Commission.

Putnam, George W., has been appointed state sanitary engineer of Missouri.

Dowler, Charles H., city manager of Wheeling, W. Va., will resign from that office to take the position of member of the West Virginia State Road Commission.

Charron, Henry S., succeeds J. Frank Kidder as superintendent of the water department at Burlington, Vt.

Applegate, Lloyd, of Youngston, Ohio, has been elected village engineer of McDonald, Ohio.

Allen, Frank R., has been appointed city engineer of Pine Bluff, Ark., to succeed J. H. Guest, resigned.

Ullius, F. W., Jr., who has been village engineer of Shorewood, Wis., for nine years, has been appointed city planning engineer of Milwaukee, Wis., to succeed R. E. Stoelting.

# New Appliances

**Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations**

### JARMIN ROAD FIXER

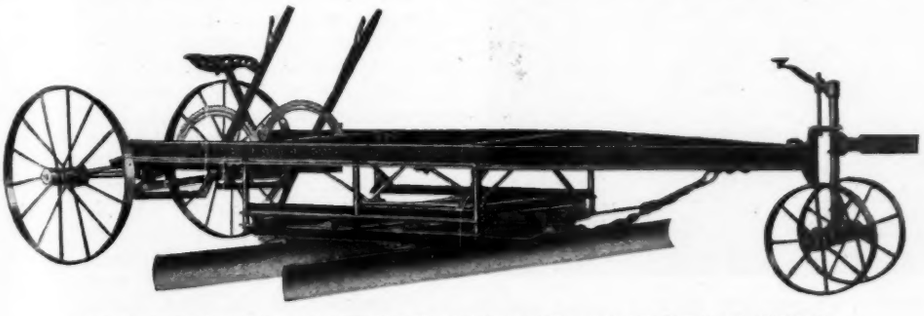
The Jarmin Road Fixer, which is manufactured by the Glide Road Machinery Company, essentially different from all other road surfacing equipment, is termed the "missing link between the road drag and the road grader." It dispenses with the road drag and does all the work that a two-man grader will do in maintaining a road. It shaves off the high places and fills in the low places, cleans ditches and moves material toward the center of the road. Its work is superior on account of the long wheel base and the two cutting edges that travel on a practically horizontal line.

The principal features of the machine are the 156-inch wheel base and the two 8-foot blades that are positively carried by the frame in such a way as to allow no up-and-down movement between the blades and frame, thus eliminating the choppy surface that is caused by blade jumping.

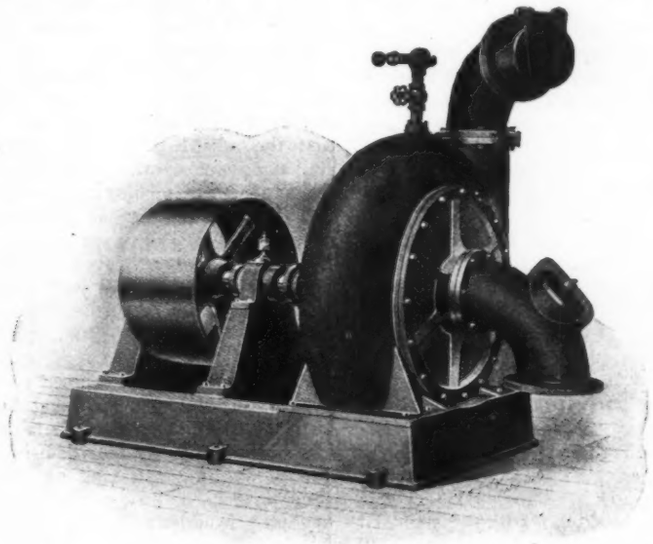
The long wheel base enables the blades to cut off the high places in a wavy road surface and to fill in the low places. The blades can be set to any angle so as to move the material either to the right or to the left. The blades are so connected that the rear blade follows directly behind the front blade. The front blade has a tendency to drag in the coarser material and the rear blade to smooth it over with finer material.

The rear end of the machine is carried by two wheels mounted on separate axles controlled by a hand lever which allows the operator to lift one side of the blade and lower the other as desired, thus maintaining the crown of the road regardless of width. The rear wheels, 36 inches in diameter, have a 3-inch concave tire and a 56-inch tread, while the small front wheels, with a 20-inch tread, clear the underside of the frame. The machine weighs 1,085 pounds, can be operated with a team, a 1-ton truck, or a light tractor and can be operated by the same man that drives the team.

One purchaser writes that he has found nothing to equal them in maintaining finished roads. Another has found them satisfactory in every class of road from macadam to heavy adobe and on dirt roads that are rutted and full of holes.



THE GLIDE ROAD MACHINERY COMPANY'S JARMIN ROAD FIXER.



HODGE, THOMAS & SHEFFER'S SAND AND GRAVEL PUMPS.

### SAND AND GRAVEL PUMPS

The centrifugal pumps manufactured by Hodge, Thomas & Sheffer, are of simple, sturdy construction especially recommended for dredging sand and gravel for construction purposes for which they are claimed to be so well adapted that they are listed in the manufacturer's bulletin as "The Contractor's Friend," and offered to make dirty gravel clean and to make fine gravel coarse.

The pumps are made for extra heavy duty with a semi-steel cast pump shell, reinforced in places that are subject to the most wear. The piston is also of heavy construction lined with steel plates that can be easily removed.

The pump is manufactured in four sizes with shipping weights of 1,095, 2,475, 4,200, and 5,475 pounds respectively with discharge pipes 4, 6, 8, and 10 inches in diameter and having rated capacities of 14, 30, 60, and 90 cubic yards of material per hour when carrying a 10 per cent. proportion of solid material. They require 4, 8, 16, and 25 hp. for each ten feet that the water is elevated and will pass stones with diameters of 2, 4½, 6, and 8 inches in diameter for the respective sizes.

If water is to be raised only 5 feet, the revolutions per minute should be 285, 214, 186, and 168 for the respective sizes, increasing 1,274, 955, 819, and 762 when water is raised to a height of 100 feet.

A portable 6-inch pump installed in a pit north of Auburn, Indiana, produced 10,158 yards of mixed sand and gravel for road construction, having 60 per cent. sand, at a cost of 46½ cents per yard for materials used. The entire plant ready for use cost about $1,250 and was operated by a traction engine. It can handle from 250 to 350 yards of sand and gravel in ten hours. It can be belt driven from a steam or gasoline engine, and is convenient, economical and efficient.

## INDUSTRIAL NOTES

The Pittsburgh Testing Laboratory has opened a sales and inspection bureau in the Railway Exchange Building, St. Louis, Missouri. Colonel N. C. Hoyles has been appointed district manager.

The Woodward-Republic Construction Co., Cleveland, Ohio, has been organized to do general engineering and construction work.

Langthorn & Smith, Inc., New York City engineers and builders, announce their incorporation to carry on the building work formerly conducted by C. H. Smith.

Orton & Steinbrenner Co., manufacturer of locomotive cranes, grab buckets and coal crushers, in order to secure larger space, has moved its offices from the 11th to the 19th floor of the Transportation Building, 608 South Dearborn Street, Chicago, Illinois.

The Strauss Bascule Bridge Co. announces the opening of a new eastern office to take the place of the New York office, at 603 Albee Building, Washington, D. C. J. C. Eversman will have charge of the office.

### MACHINE TRENCHING RECORDS

Satisfactory records of trench excavating with the standard Pawling & Harnischfeger Ladder Type Trencher have been made by Thomas Haverty & Co., Los Angeles, who, with the standard machine, cut 552 linear feet of trench 30 inches wide and from 9 to 12 feet in depth in 4 hours, working at an 8 per cent. grade.

Although this machine was not rated for digging below 8 feet depth the same contractors successfully used it in excavating a 30-inch trench to a depth of 30 feet at one operation, an achievement which was accomplished by the addition of an extension boom not recommended by the manufacturer.

These trenches have been dug by the aid of the machine at the rate of 45 to 50 linear feet per hour, with a record of 720 feet in one day, working up a 5 per cent. grade.

### ROOT SPRING SCRAPER SERVICE

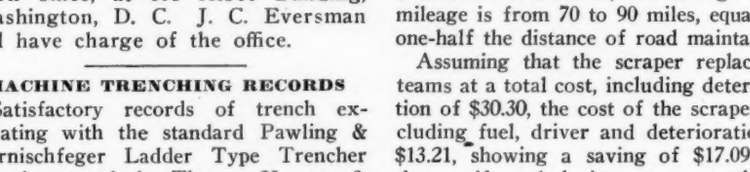
The engineer manager and the county engineer of Ottowa County, Michigan, report that a Root Spring Scraper, installed last fall, on trunk line 16, between Grand Haven and Grand Rapids, satisfactorily replaced four or five teams and that during the present year the same scraper will be used on a 2-ton Nash quad-truck on a gravel road 19 miles long between Jenison and Zealand, where there is a traffic of 1,000 vehicles daily and it is expected that the use of the scraper will reduce the number of patrol men previously required.

In his report to the Board of County Road Commissioners, County Engineer Allen M. Williams stated his opinion that the new Root Spring Scraper installed on one of the Nash quad-trucks gives a superior quality of work and that the action of the springs on the scraper counteracts the vibration of the truck, leaving a small and even swath. The best results are attained with a speed of 8 to 12 miles an hour, the average daily mileage is from 70 to 90 miles, equalling one-half the distance of road maintained.

Assuming that the scraper replaces 6 teams at a total cost, including deterioration of $30.30, the cost of the scraper including fuel, driver and deterioration is $13.21, showing a saving of $17.09 per day or if used during seven months of the year would amount to $3,110.38 per truck.

The scrapers are also efficient for removing snowfall up to 12 inches in depth.

For the construction of nearly seven miles of brick pavement on a concrete base, between Putnamville and Meridan, Ind., the Carpenter Construction Co., contractor, has ordered Koppel riveted track with slip end ties and Koppel batch box cars with Koppel continuous draft gear to take strain away from end and side sills. Koppel wooden drop bottom batch boxes will handle the aggregate to the paver.




PAWLING & HARNISCHFEGER TRENCHER EXCAVATING 550 FEET OF DEEP TRENCH IN FOUR HOURS.

## TRADE PUBLICATIONS

### THE UNA-FLOW STEAM ENGINE

By Prof. Dr.-Ing. h. c. J. Stumpf. 7½ x10½ inches, 319 pages, cloth covers. illustrated with numerous detail diagrams and half-tones. Translated by the Stumpf Una-Flow Engine Company, Inc., 401 S. A. & K. Building, Syracuse, N. Y.

In the opening chapters of the book the different losses of the steam engine are investigated. The causes and effects are defined, as well as the relations between them, and the manner is pointed out in which the minimum value of each loss is obtainable. After considering all of the seven different losses occurring in a steam engine, the question is asked as to how a steam engine must be designed in order to have a minimum total of all the seven losses. In answer to this query two different designs are presented, one being a stationary Una-Flow engine with single-beat valves for condensing operation, and the other a Una-Flow locomotive, equipped with single-beat valves.

Both types of engines were developed during the year 1920. Lower steam consumption figures than those given by the best multi-stage engines are obtainable with these types for both saturated and superheated steam. The experience gained with Una-Flow engines in widely different fields and under the most varying conditions was utilized in the design of these engines.

A number of chapters are devoted to the description of this development in all its phases.

The novelty in this case is the single-beat valve, which has so far been used only in internal combustion engine practice. All previous attempts to apply it to steam engines have miscarried. The application of this type of valve to the Una-Flow engine represents the keystone in the development of the latter.

### HANDBOOK OF PIPE.

Issued by the East Jersey Pipe Co. A manual providing tables, charts and other useful information relating to the carrying of fluids and gases by pipes; pipe installation and test data having to do with large diameter steel pipes together with the story of lock bar and riveted steel pipes, from 20 to 72 inches in diameter, with special couplings, joints, riveted tees, reducers and specials and a complete line of fittings. Half tone illustrations of details and installations, numerous convenient tables. Principal features discussed include material specifications, fabrications, joints, fittings, tests, working brushes, pipe data, corrosion, and electrolosis, cost, failure of pipe lines, hydraulics, weir measurements, water power, water supply, testing lines, installation of pipe lines, distribution of water, water consumption, and formula.

# Index of the Month's Periodicals

**In Which Are Listed and Classified by Subjects All Articles Treating of Public Works and Utilities Which Have Appeared During the Past Month in the Leading Periodicals.**

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with public works and utilities. The Index is kept up to date, and the month of literature covered each time is the calendar month immediately prior to publication. Our chief aim in this is to keep our readers in touch with all the current literature on the subject referred to. The length of each article is given, and the name of the author when it is a contributed article; also the name and the place of publication of the periodical in which it appeared

### STREETS AND ROADS

Dallastown Asphalt-Concrete Highway. 850 words. Public Works, June 17, New York.

Use of Tar in Road Construction. 2,100 words. Public Works, June 3, New York.

Court Denies Infringement of Warren Paving Patent. 1,500 words. Engineering News-Record, June 15, New York.

Jointed Concrete Pavement in New York State. 1,500 words. Illustrated. Engineering News-Record, June 1, New York.

Experiments With the Construction Joints in Concrete Pavement. 1,000 words. Illustrated. Engineering News-Record, June 29, New York.

Calcium Chloride Experiment. State highway commission experimenting with calcium chloride. 1,800 words. Illustrated. North Carolina Highway Bulletin, May, Raleigh.

Wisconsin's Unique Team Patrol System. By R. E. Balliette. 1,000 words. Illustrated. Highway Magazine, June, Chicago.

Operation of a County Maintenance Organization on Gravel Roads. By Sam Steigerwalt. 1,000 words. Municipal and County Engineering, June, Indianapolis.

Maintenance of Gravel Roads. By E. R. Olbrich. 1,850 words. North Carolina Highway Bulletin, May, Raleigh.

Public Roads Bureau to Expand Research Program. 1,350 words. Illustrated. Engineering News-Record, June 15, New York.

Design Features of Lincoln Highway "Ideal Section." By W. G. Thompson. 5,750 words. Illustrated. Engineering News-Record, June 15, New York.

Comparison of Road Drainage by Deep Side Ditches and Tile Drains. By Chas. M. Upham. 2.500 words. Municipal and County Engineering, June, Indianapolis.

The Illinois Road Tests. 2,000 words. Illustrated. Public Works, June 10, New York.

Results of Heavy Traffic on Pittsburgh Test Road. 3,500 words. Illustrated. Engineering News-Record, June 29, New York.

An Economic Foundation for Highway Progress. By Thomas H. MacDonald. 3,000 words. Engineering News-Record, June 8, New York.

Fundamentals of Design for Safe Roads. By A. R. Hirst. 1,000 words. American City, June, New York.

Constructing Highway Curves for Traffic Safety. 1,450 words. Municipal and County Engineering, June, Indianapolis.

Recent Developments in the Design of Road Structures for Modern Heavy Traffic. By P. J. M. Larranaga. 1,850 words. Municipal Engineering and the Sanitary Record, June 8, London.

Concerning Detours. 1,250 words. North Carolina Highway Bulletin, May, Raleigh.

South Carolina and Her Road Program. 855 words. Illustrated. Earth Mover, June, Aurora.

Ontario Provincial Highways. By George Hogarth. 2,000 words. Canadian Engineer, May 30, Toronto.

The Outlook for Road Building. An interview with H. Eltinge Breed. 2,150 words. Engineering News-Record. June 1, New York.

Methods of Paying for Paving. Table. Public Works, June 3, New York.

Co-operative Road Improvement and Future Policies. By Thos. H. MacDonald. 3,350 words. Canadian Engineer, June 13, Toronto.

Minnesota's Successful New Highway Development Plan. 2,750 words. Municipal and County Engineering, June, Indianapolis.

Charlotte-Statesville Highway Under Construction. 1,350 words. Illustrated. North Carolina Highway Bulletin, May, Raleigh.

Improving East Ohio Street, Pittsburgh. 1,650 words. Illustrated. Public Works, June 24, New York.

Recommended Procedure in the Construction of Granite Block Pavements. By Clarence D. Pollock. 1,750 words. Illustrated. Municipal and County Engineering, June, Indianapolis.

### WATER SUPPLY

Water Purification Plant Operation in Illinois. By M. W. Cowles. 5,000 words. Engineering and Contracting, June 14, Chicago.

Water Softening as a Factor in Municipal Supply. By Wm. M. Barr. 1,500 words. Engineering and Contracting, June 14, Chicago.

Prevention of Tastes and Odors Due to Microscopic Organisms. By Wm. W. Brush. 1,850 words. Illustrated. Engineering and Contracting, June 14, Chicago.

Public Water Supplies in Illinois. By Harry F. Ferguson. 1,850 words. Engineering and Contracting, June 14, Chicago.

Water Supply in Its Relation to Sewage Disposal. By J. Clark Keith. 1,550 words. Canadian Engineer, June 13, Toronto.

Don'ts for Sewerage and Water Works Designers. 2,650 words. Public Works, June 24, New York.

Present Day Tars for Pipe Coatings. 2,500 words. Canadian Engineer, May 30, Toronto.

Causes of Failure in Cast Iron Pipe. By F. A. McInnis. 2,150 words. Canadian Engineer, May 30, Toronto.

Tacoma Builds Semi-Circular Conduit of Gunite. 3,650 words. Illustrated. Engineering News-Record, June 1, New York.

Pipe Friction and Pump Efficiency. By Wm. Brazenall. 1,850 words. Water and Water Engineering, May 20, London.

An Electrolysis Investigation on a 36-Inch Steel Force Main. 1,000 words. Illustrated. American City, June, New York.

Underground Leakage and Its Relation to Mains and Services. By Thomas F. Wolfe. 1,900 words. Engineering and Contracting, June 14, Chicago.

Causes of Failure in Cast Iron Pipe. By F. A. McInnes. 1.350 words. Engineering and Contracting, June 14, Chicago.

Discharge Capacity of Wood Pipe and Formulas for Calculating Flow. By J. W. Ledoux. 1,150 words. Engineering and Contracting, June 14, Chicago.

Water Hammer in Wood Pipes. By J. W. Ledoux. 1,100 words. Engineering and Contracting, June 14, Chicago.

Concrete Pipe With Improved Joints as Used in St. John, New Brunswick. 1,250 words. Illustrated. Engineering and Contracting. June 14, Chicago.

The Right Kind of Coating for Pipe. By William R. Conard. 3,150 words. Fire and Water Engineering, June 21, New York.

A History of the Corrosion of the 36-Inch Steel Force Main at Akron, Ohio. By G. Gale Dixon. 6,000 words. Illustrated. Journal of the New England Water Works Association, June, Boston.

Investigation of Electrolysis on Steel Force Main at Akron, Ohio. By Victor B. Phillips. 4,750 words. Journal of the New England Water Works Association, June, Boston.

Cement Joints for Cast Iron Water Mains. By D. D. Clarke. 1,000 words. Journal of the New England Water Works Association, June, Boston.

Electrification of Gate Valves. 3,350 words. Illustrated. Journal of the New England Water Works Association, June, Boston.

Modern Pumping and Hydraulic Machinery. 1,850 words. Water and Water Engineering, May 20, London.

Pumping and Filter Plant at Sturgeon Falls, Ont. 1,650 words. Illustrated. Canadian Engineer, June 13, Toronto.

Motor Driven Centrifugals With Gas Engine Standby. By W. B. Bushnell. 1,650 words. Municipal and County Engineering, June, Indianapolis.

[illegible]struction Features on 279-Foot Don Pedro Dam. By R. McC. Beanfield. 3,350 words. Illustrated. Engineering News-Record, June 1, New York.

[illegible] Hill Dam. 2,150 words. Illustrated. Public Works, June 3, New York.

Reinforced Concrete for Water Retaining Structures. By H. C. Ritchie. 5,850 words. Illustrated. Water and Water Engineering, June 20, London.

The Design and Construction of the Gloversville Standpipe. By Frank A. Marston. 7,850 words. Illustrated. Journal of the New England Water Works Association, June, Boston.

The Construction of the Loch Raven Dam of the Baltimore Water Works. By Wm. A. Megraw. 2,500 words. Municipal and County Engineering, June, Indianapolis.

Construction of Loch Raven Dam. By Wm. A. Megraw. 1,650 words. Illustrated. Public Works, June 24, New York.

Construction of Loch Raven Dam. By Wm. A. Megraw. 1,850 words. Illustrated. Public Works, June 17, New York.

Proposed Extension of the Metropolitan Water District. By X. H. Goodnough. 30,000 words. Illustrated. Journal of the New England Water Works Association, June, Boston.

Chester Waterworks: Past and Present. By Frederick Storr and C. W. Bennett. 5,850 words. Illustrated. Water and Water Engineering, June 20, London.

Water Divining Up to Date. By Percy Griffith. A rejoinder to Dr. Church and others. 2,350 words. Municipal Engineering and the Sanitary Record, May 25, London.

Water Divining Up to Date. By Percy Griffith. Part 2. 1,550 words. Municipal Engineering and the Sanitary Record. June 8, London.

Topical Discussion: Can High-Value Watershed Lands Be Put to Profitable Use? 5,000 words. Journal of the New England Water Works Association, June, Boston.

Why There Should Be a Service Charge. By J. Walter Ackerman. 3,850 words. Fire and Water Engineering, June 28, New York.

Flat Rates Caused Water Waste. By Gilberg S. Fraser. 1,200 words. Illustrated. American City, June, New York.

Some Observations on Water Consumption. By Charles W. Sherman. 2,350 words. Illustrated. Journal of the New England Water Works Association, June, Boston.

How to Improve Relations Between Public and the Utility. By O. H. Bessell. 2,250 words. Engineering and Contracting, June 14, Chicago.

The Consumer Is Sensitive—Handle Him Carefully. By O. H. Bissell. 4,350 words. Fire and Water Engineering, June 14, New York.

Water Works in Healthier Financial Condition. By Leonard Metcalf. 3,500 words. Illustrated. Fire and Water Engineering, June 7, New York.

The Business of Water Works Management, Part 2. By George A. Johnson. 1,850 words. American City, June, New York.

American Water Works Convention. 1,750 words. Public Works, June 3, New York.

Water Works Convention. 2,850 words. Public Works, June 10, New York.

Superintendents Swap Experiences. A. W. W. A. convention. 3,500 words. Fire and Water Engineering, May 31, New York.

## SEWERAGE AND SANITATION

On the Proper Value of Kutter's n for Sewer Computations. By Charles W. Sherman. 3,350 words. Engineering News-Record, June 8, New York.

Sewer Trenching in Running Sand. 1,550 words. Illustrated. Public Works, June 24, New York.

The Miles Acid Process of Sewage Treatment. By F. W. Mohlman. 4,350 words. Water and Water Engineering, May 20, London.

Miles Acid Process. 2,750 words. Public Works, June 3, New York.

The Disposal of Sewage Screenings. By William F. Morse. 1,000 words. Municipal and County Engineering, June, Indianapolis.

Discussion on Paper "Prevention of Sewage Contamination in Ontario." 2,000 words. Canadian Engineer, June 13, Toronto.

Engineers' Plans for State Health Boards. 1,750 words. Public Works, June 10, New York.

Engineers' Plans for State Health Boards. 1,550 words. Public Works, June 17, New York.

The Need for Health Training in Our Schools. By George T. Palmer. 1,150 words. American City, June, New York.

Sanitation of Automobile Camps. 1,000 words. Municipal Record, June 8, San Francisco.

## LIGHTING AND POWER

Average Cost of Illuminating Streets in Fifty Best Lighted Cities About $2.05 Per Capita. By A. F. Dickerson. 1,225 words. Pacific Municipalities, June, San Francisco.

City Demonstrates the Development of Electric Street Lighting. By H. L. Dollahan. 1,150 words. Illustrated. American City, June, New York.

A Low Head Hydro-Electric Development of 96,000-horse power. By W. Francis Lloyd. 850 words. Illustrated. Water and Water Engineering, May 20, London.

Hydro-Electric Resources of Brazil, and Her Requirements for Electrical Equipment. 2,450 words. Water and Water Engineering, June 20, London.

Water Power in Finland. 1,650 words. Illustrated. Water and Water Engineering, June 20, London.

Preventing Loss of Power Due to High Backwater. By J. A. Sirnit. 2,750 words. Illustrated. Engineering News-Record, June 8, New York.

California's Water and Power Act. By Rudolph Spreckels. 1,200 words. Pacific Municipalities, May, San Francisco.

The Modern Hydraulic Turbine. By J. Johnstone Taylor. 1,050 words. Water and Water Engineering, May 20, London.

Progress in Water-Wheel Design. 2,750 words. Illustrated. Engineering News-Record, June 1, New York.

Power and Irrigation Development in Palestine. 5,350 words. Illustrated. Engineering News-Record, June 22, New York.

Power Company Makes Extensive Triangulation Survey. By W. Musset-ter. 2,850 words. Illustrated. Engineering News-Record, June 29, New York.

The Grampian Electricity Scheme. 1,350 words. Water and Water Engineering, June 20, London.

Selecting a Boiler-Feed Regulator for the Municipal Power Plant. By W. F. Schaphorst. 2,000 words. Illustrated. American City, June, New York.

## TRAFFIC AND TRANSPORTATION

Traffic Capacity and Widths of Highways Outside Municipalities. 1,550 words. Canadian Engineer, May 30, Toronto.

Los Angeles Mapped From Air to Aid Traffic Studies. By C. H. Richards. 2,000 words. Illustrated. Engineering News-Record, June 8, New York.

Analysis of Present Highway Traffic. By John H. Mullen. 3,550 words. Illustrated. Canadian Engineer, May 30, Toronto.

Traffic on Maryland's Roads Shown on Map. By A. N. Johnson. 1,500 words. Illustrated. Engineering News-Record, June 8, New York.

The Railroad as an Operator of Highway Transport. 2,200 words. Canadian Engineer, May 30, Toronto.

Devices for Traffic Control. By C. H. Shepherd. 1,350 words. Illustrated. American City, June, New York.

Some Engineering Aspects of New York Traffic. 1,350 words. Engineering News-Record, June 22, New York.

The Highway Transport Clearing House. By Tom Snyder. 2,750 words. Municipal and County Engineering, June, Indianapolis.

Adjusting Track Construction to a Light Weight Street Car. 1,000 words. Illustrated. Engineering and Contracting, June 21, Chicago.

## CITY PLANNING

A Zoning Primer. By the Advisory Committee on Zoning, appointed by Sec. Hoover. 2,750 words. Pacific Municipalities, June, San Francisco.

Town Planned to Meet Civic Needs. Suburb of Cincinnati to be built with regard to requirements of beauty and civic efficiency. 1,150 words. American Contractor, June 3, Chicago.

The Administrative and Financial Machinery for Carrying Out the City Plan. By Herbert S. Swan. 1,850 words. Illustrated. American City, June, New York.

Comprehensive City Plan for Richmond. By Guy Winifred Hayler, city planner. 1,150 words. Pacific Municipalities, May, San Francisco.

Suggestions on Subdivision Planning. By S. G. Swigart. 1,800 words. Municipal and County Engineering, June, Indianapolis.

Papers and Discussions on City Planning. "Fundamentals of Transit Planning for Cities." By Daniel L. Turner. "Street System Design in Relation to Vehicular Traffic." By Ernest R. Goodrich. Short Abstracts. 4,150 words. Engineering News-Record, June 15, New York.

Planning for an Urban Population of Thirty-Seven Millions. 1,250 words. Illustrated. American City, June, New York.

Suburban Problem of Greater Winnipeg. 1,350 words. Canadian Engineer, June 13, Toronto.

Garden Cities and Model Dwellings as Conceived by the French. By W. P. Mitchell. 2,000 words. Illustrated. Engineering and Contracting, June 28, Chicago.

An English View of the Disadvantages of High Buildings. 1,750 words. Engineering and Contracting, May 31, Chicago.

Some Conclusions From Recent Visits in Germany, Holland, Belgium, France and England. By Stephen Child. 1,500 words. Illustrated. American City, June, New York.

The New American Falls, Idaho. By Russell Van Nest Black, town planner. 2,000 words. Pacific Municipalities, May, San Francisco.

Municipal Utilities in Palo Alto. By Frank Kasson, city clerk. 1,500 words. Pacific Municipalities, May, San Francisco.

Topographical Survey of London, Ont. By Douglas H. Nelles. 2,350 words. Illustrated. Canadian Engineer, May 30, Toronto.

## GOVERNMENT AND FINANCE

A Defense of Bid Bonds. 1,550 words. The Bulletin of the General Contractors Association, June, New York.

Budget Making and the Citizens' Interest. By Lionel Weil. 1,575 words. Illustrated. American City, June, New York.

State Aid for Pennsylvania Municipalities. 1,175 words. Illustrated. American City, June, New York.

What Are Women Mayors Doing? By Mildred Adams. 1,000 words. American City, June, New York.

## STRUCTURES AND MATERIALS

Solving the Problems of the Portland Cement Industry. By F. W. Kelley. 3,150 words. Engineering News-Record, June 15, New York.

To Avoid Variable Concrete Due to Variable Sand Wetness. By R. L. Bertin. 1,350 words. Engineering News-Record, June 22, New York.

Aggregate Strength No Measure of Concrete Strength. By F. E. Giesecke. 1,450 words. Illustrated. Engineering News-Record, June 29, New York.

Explosives in Producing Crushed Stone. 1,850 words. Public Works, June 17, New York.

Some Sharp Lumber Practices Defined. 2,500 words. American Contractor, June 10, Chicago.

Large Hollow Concrete Blocks Form Dock Wall. 1,650 words. Illustrated. Engineering News-Record, June 8, New York.

Arched Bridges of Wide Span. By Dr. F. von Emperger. 6,850 words. Illustrated. Engineering and Contracting, May 31, Chicago.

Substructure of Edmundston-Madawaska Bridge. By G. McN. Steeves. 4,150 words. Illustrated. Canadian Engineer, May 30, Toronto.

Large Steel Arch Bridge Ribs Encased in Gunite. By C. B. McCullough. 3,500 words. Illustrated. Engineering News-Record, June 8, New York.

Hydraulic Design of Bridge Waterways. By Ivan E. Houk. 4,500 words. Illustrated. Engineering News-Record, June 29, New York.

Artistic Design of Bridges. By Chas. Evan Fowler. 1,350 words. Canadian Engineer, June 13, Toronto.

Concrete Plant for Springfield Bridge. 900 words. Illustrated. Public Works, June 17, New York.

Piers and Abutments of the Springfield Bridge. 2,000 words. Illustrated. Public Works, June 10, New York.

Castleton Bridge Contracts Let 1,650 words. Illustrated. Engineering News-Record, June 15, New York.

Maintenance Methods for Highway Bridges in Minnesota. 1,550 words. Engineering and Contracting, June 28, Chicago.

Concrete Truss Girder in New Street Viaduct at Dover. 1,750 words. Illustrated. Engineering and Contracting, May 31, Chicago.

Stresses in Arch Ribs Determined by Sway Lines and Sway Polygons. By Arvid Reuterdahl. Part 5. 5,000 words. Illustrated. Bulletin of the Minnesota Federation of Architectural and Engineering Societies, June, St. Paul.

The Thrust in Skew Arches. By Daniel Royse. 2,500 words. Illustrated. Municipal and County Engineering, June, Indianapolis.

Factors Affecting Fire Resistance of Building Columns. By S. H. Ingberg. 2,850 words. Engineering News-Record, June 29, New York.

Proper Finishing and Protection Against Rapid Drying, Important Features of Concrete Floor Construction. By J. E. Freemen. 1,700 words. Engineering and Contracting, June 28, Chicago.

Heavy Steelwork in New Theater and Office Building. 3,000 words. Illustrated. Engineering News-Record, June 22, New York.

Reconstruction of Old Building Offers Interesting Problems. By Walter H. Wheeler. 3,500 words. Illustrated. Improvement Bulletin, June 24, Minneapolis.

Caisson Cofferdam Foundation With Special Bracing. By T. Kennard Thomson. 3,350 words. Illustrated. Engineering News-Record, June 1, New York.

*(Continued on page 25)*

# Advance Contract News

## ADVANCE INFORMATION ITEMIZED PRICES

**To be of value this matter must be printed in t he number immediately following its receipt, which makes it impossible for us to verify it all. Our sou rces of information are believed to be reliable, but we cannot guarantee the correctness of all items. Partie s in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.**

## BIDS ASKED FOR

### STREETS AND ROADS

**Ala., Jasper 10:30 a.m., July 29**
For const. 3 mi. public rds. in Walker Co.—Co. Hwy. Com.

**Cal., Sacramento 2 p.m., July 24**
For reconstructing 9.9 mi. hwy., also bridge.—Austin B. Fletcher, St. Hwy. Engr.

**Cal., Burbank 7:30 p.m., July 18**
For grad., impv., gutters and curb. —F. S. Webster, City Clk.

**Fla., Ft. Myers Aug. 9**
For clear., grad. and pav. on rock base 8.5 mi. rd.—Co. Comrs.

**Ill., Moline 10 a.m., July 21**
For grad., drain., curb. and pav. with conc.—Bd. Local Impvs.

**Ill., Mt. Carmel 3 p.m., July 18**
For pav., curb., concrete bridge and some sewer pipes.—Mayor.

**Ind., Boonville 7 p.m., July 18**
For st. impv.—Retta Rickerson, City Clk.

**Ind., Indianapolis 10 a.m., July 25**
For const. 3.533 mi. F. A. 32, Sect. A-C.—J. D. Williams, Dir., State Hwy. Com.

**Ind., Warsaw 2 p.m., July 24**
For grad. and conc. pav. public hwy. —Tom J. Nye, Co. Aud.

**Ind., Browntown 1 p. m., Aug. 7**
For impv. 26,170 ft. rd., $36,700, and 6,163 ft., $3,990, both gravel.—Samuel Carr, Co. Aud.

**Ind., Columbus 10 a.m., Aug. 8**
For impv. 9,410 ft. rd., $7,000, gravel. —Ray Henderson, Co. Aud.

**Ind., Albion 2 p.m., Aug. 3**
For grading, drain. and pav. sev. hwys.—H. Clayton Erwin, Co. Aud.

**Ind., Broad Ripple 7:30 p.m., July 25**
For pav., constr. curbs and gutters, also sewers in sev. sts.—Bd. of Trustees.

**Ind., Crown Point 1 p.m., July 31**
For grad., pav. and drain. gravel rd. —George M. Foland, Co. Aud.

**Ind., Valparaiso 2 p.m., Aug. 8**
For constr. 4.643 mi. and 1.759 mi. gravel rds., $86,135.73 and $22,880.80.—B. H. Kinne, Co. Aud.

**Ind., Decatur 10 a.m., Aug. 8**
For const. macadamized rd.—Martin Jaberg, Co. Aud.

**Ind., Evansville 10 a.m., Aug. 3**
For impv. Petersburgh rd.—Willis M. Copeland, Co. Aud.

**Ind., Ft. Wayne 10 a.m., July 31**
For impv. 15,494 and 10,946 ft. rd. with stone.—Angus C. McCoy, Co. Aud.

**Ind., Goshen 1 p.m., July 31**
For impv. by pav. with conc. 25,110 ft., 15,790 ft., 16,397 ft., 13,000 ft. and 21,200 ft. rd., and with gravel 15,883 ft., 31,700 ft. and 15,847 ft.—Chas. A. Croop, Co. Aud.

**Ind., Greencastle 1:30 p.m., Aug. 7**
For impv. 4,100 ft. rd. with gravel and 6,168 with mac.—Ralph E. Knoll, Co. Aud.

**Ind., Indianapolis 2 p.m., July 24**
For grad. and pav., resurf., etc., on sev. sts.—Bd. Pub. Wks.

**Ind., Indianapolis 10 a.m., July 31**
For const. hwy. imp. in Center twp.—Leo K. Fesler, Co. Aud.

**Ind., Logansport 10 a.m., July 26**
For impv. Asylum rd., $25,168, and Jas. P. Johnson et al. rd., $14,953.—Harry M. Gardner, Co. Aud.

**Ind., Marion 2 p.m., Aug. 8**
For impv. with stone and gravel 10,-633 ft. rd., $16,000, and 13,259 ft., $20,990 —Austin D. Hunt, Co. Aud.

**Ind., Terre Haute 11 a.m., Aug. 9**
For impv. Samuel E. Moore et al. rd., $7,816.—Chas. M. Lee, Co. Aud.

**Ind., Wabash 10 a.m., Aug 8**
For impv. 7,452 ft. rd., gravel.—Ben Banister, Co. Aud.

**Ind., Winchester 11 a.m., July 28**
For impv. 5,280 ft. conc. rd., $24,962.—Jas. M. Browne, Co. Aud.

**Ia., Carroll 1:30 p.m., July 26**
For grad. 3.16 mi. prim. rd.—Co. Aud.

**Ia., Ft. Dodge 1:30 p.m., July 18**
For grad. and drain. 5.492 mi. rd. and oiling 0.475 mi.—Co. Aud.

**Kan., Iola Aug. 1**
For constr. 0.992 mi. conc. or bit. filled brick rd.—St. Hwy. Com.

**Ky., Frankfort 1 p.m., July 19**
For impv. sev. rds.—Joe S. Boggs, St. Hwy. Engr.

**Ky., Louisville 1 p.m., July 19**
For surf. treat. rds. in various cos., and const. bridge.—St. Hwy. Com.

**Md., Baltimore 12 M., July 25**
For constr. 1.3, 1.2, 0.26, 1.5, 1.5, 0.75, 3.7, 1.8 mi. of st. hwy.—John N. Mackall, Ch. St. Rds. Com.

**Md., Frostburg July 23**
For st. pav.—City Council.

**La., New Orleans Sept. 19**
For pav. 55 sts.—A. Klorer, City Engr.

**Md., Baltimore 10 a. m., July 19**
For resurf., pav., etc.—Bd. Awards.

**Mass., Boston noon, July 20**
For sh. asph. and bitul. pavt., Dorchester.—Jos. A. Rourke, Comr. Pub. Wks.

**Mass., Boston noon, July 20**
For resurf. rd.—Park Comrs.

**Mass., Boston 1 p.m., July 18**
For 18,430 ft. bit. mac. rd. in Sterling and W. Boylston, 5,160 in Lowell and 6,400 cem. conc. rd. in Andover.—A. W. Dean, Ch. Engr., Dept. Pub. Works, Div. Hwys.

**Mich., Cheboygan 10:30 a.m., July 26**
For impv. 1.923 mi. rd. by shaping, const. drain. structures and surf.—F. F. Rogers, St. Hwy. Comr.

**Mich., Fenton 12:30 p.m., July 22**
For impv. 2.694 mi. rd. by shaping, const. drain. structures and surf. with conc.—F. F. Rogers, St. Hwy. Comr.

**Mich., Lapeer 1 p.m., July 21**
For shaping rd., const. drain. structures and surf. on 1.390 mi. rd.—F. F. Rogers, St. Hwy. Comr.

**Mich., Monroe 12:30 p.m., July 21**
For impv. 5.383 mi. rd. by shaping, const. drain. structures and surf. with rein. conc. pavt.—F. F. Rogers, St. Hwy. Comr.

**Minn., St. Paul 11:30 a.m., July 24**
For pav. material, pav., grad. and impv. sts.—H. W. Austin, Purch. Agt.

**Minn., St. Paul Aug. 1**
For const. 18 State projs.—C. M. Babcock, Comr. Hwys.

**Minn., St. Paul Aug. 2**
For const. 12 State projs.—C. M. Babcock, Comr. Hwys.

**Minn., St. Paul 11:30 a.m., July 17**
For pav., grad. and impv. sev. sts.—H. W. Austin, Purch. Agt.

**Miss., Quitman Aug. 8**
For misc. repair work.—St. Hwy. Com.

**Mo., Albany 1 p.m., July 18**
For grad. and surf., etc., on Proj. 54. —B. H. Piepmeier, Ch. Engr., St. Hwy. Com.

**Mo., Kansas City 2 p.m., July 18**
For constr. and grad. sev. sts., also constr. curbs.—F. E. McCabe, Sec'y Bd. of Pub. Wks.

**Mo., Columbia 4 p.m., July 24**
For grad., curb., guttering and pav. with rock asph. 5 sts.—John S. Bicknell, City Clk.

**Mo., St. Louis noon, July 25**
For reconst. and impv. alleys.—Bd. Pub. Serv.

**Mo., Kennett 7 p.m., July 18**
For excav., rein. conc. pavt., curb., sewers, etc.—City Council.

**Mo., Danville 1 p.m., July 20**
For grad., const. culvts., etc., on 1.879 mi. Proj. 20.173.—B. H. Piepmeier, Ch. Engr., St. Hwy. Com.

**N. J., Jersey City 3 p.m., July 18**
For regulat. and resurf. rdways.—Edw. J. Holland, City Clk.

**N. C., Raleigh July 25**
For impv. various state projs.—State Hwy. Com.

**N. C., Edenton July 20**
For grad., conc. bridge and conc. or asph. pav., 4½ mi. rd., $125,000.—Co. Comrs.

**N. C., Greenville noon, July 31**
For pav. with conc. 12 mi. rd.—Pitt Co. Hwy. Com.

**N. D., Hillsboro July 27**
For constr. 6.923 mi. earth rd.—St. Hwy. Com.

**O., Akron noon, July 20**
For impv. 1.3 mi. rd.—Bd. Co. Comrs.

**O., Bowling Green July 19**
For concreting or mac. cert. sts.—Geo. W. Fearnside, Serv. Dir.

**O., Cleveland noon, July 19**
For pav. and sidewalks.—Comr. Purchases and Supplies.

**O., Columbus noon, July 25**
For street impv. and sewer const.—W. H. Duffy, Dir. Pub. Serv.

**O., Bowling Green 9 a.m., July 18**
For const. bridge and approach and incidental work on 0.25 mi. Proj. 188.—B. H. Piepmeier, Ch. Engr., St. Hwy. Com.

**O., Columbus July 20**
For pav. two secs. rd.—Leon C. Herrick, St. Dir. Hwys.

**O., Elyria July 25**
For grad., conc. and drain. rd.—Clk., Co. Com.

**O., Newark July 22**
For pav. rd.—C. W. Irwin, Co. Surv.

**O., Lisbon July 21**
For grad. and drain. Wellsville-Salineville public rd.—Co. Comrs.

**O., Newark July 20**
For pav. rdways.—Lee Moore, Serv. Dir.

**O., Kallipolis July 22**
For const. brick pavt.—Co. Comrs.

**O., Columbus July 19**
For pav. with bit. mac., $30,182, and reconst. 0.34 mi. rd., $15,762.—C. C. Lattimer, Engr., Court House.

**Pa., Parnassus 8 p.m., July 20**
For brick pav. on conc. base, curb and gutter, grad., etc.—J. M. Wallace, Boro. Sec'y.

**Pa., Ebensburg 10 a.m., July 23**
For reconst. 22,600 ft. hwy.—Co. Controller.

**R. I., Warwick 1 p.m., July 25**
For curb., grad. and oiling.—Jas. T. Lockwood, Town Clk.

**R. I., Providence 11 a.m., July 19**
For reconst. 2,450 ft. st. hwy.—State Bd. Pub. Rds.

**S. C., Anderson July 20**
For rd., bridge and culvert work on 5.265 mi. of rd.—Co. Hwy. Com.

**Tex., Cameron 2 p.m., July 25**
For bldg. 17.94 mi. hwy.—A. F. Mitchell, Co. Engr.

**Wash., Olympia 11 a.m., July 21**
For clear., grub., grad. and grav. surfacing 4.8 mi. hwy.—E. A. White, Co. Engr.

**Wash., Olympia 2 p.m., Aug. 1**
For pav. ¾ mi. Pacific Hwy.—James Allen, Supvr. St. Hwy. Com.

**Wash., Tacoma 11 a.m., July 21**
For impv. 4.088 mi. Perm. Hwy. No. 13-D.—Bd. Co. Comrs.

**Wis., Madison 10 a.m., July 18**
For grad. and surf. Menomonie-Hudson and Menomonie-Hudson Rd. Proj. 1024.—Wis. Hwy. Com.

**Wis., Madison July 19**
10 a.m., for grad. and pav. Madison-Verona, Reedsburg-Spring Green rds.; 2 p.m., Madison-Oregon rd.—Wis. Hwy. Com.

### SEWERAGE

**Ia., Dyersville July 19**
For san. sewer...City Council.

**Kans., Emporia 10 a.m., July 19**
For sewage disposal plant.—E. T. Mendel, City Clk.

**Mass., Boston** noon, July 19
For const. sewerage works.—Jos. A. Rourke, Comr. Puk. Wks.
**Mass., Boston** noon, July 20
For bldg. catchbasins, manholes, minor drains and surface drains.—Jos. A. Rourke, Comr. Pub. Wks.
**Minn., Belle Plaine** 8 p.m., July 24
For const. lateral sewers.—Boro. Council.
**Minn., St. Paul** 11:30 p.m., July 24
For san., storm sewers, etc., in sev. sts.—H. W. Austin, Purch. Agt.
**Minn., Brainerd** 7:30 p.m., July 27
For const. general sewer.—G. W. Grewcox, City Clk.
**Mo., Kansas City** 2 p.m., July 18
For constr. sev. sewers.—F. E. McCabe, Sec'y Bd. Pub. Wks.
**N. Y., Manhattan** 2 p.m., July 20
For const. sewer and const. 4-ft. circular wooden barrel sewer.—Julius Miller, Boro. Pres., Mun. Bldg.
**O., Bowling Green** July 19
For const. sanitary sewer.—Geo. W. Fearnside, Serv. Dir.
**Pa., Easton** 9:30 a.m., July 18
For const. storm water sewer.—C. A. Reese, City Engr.
**Pa., York** 9 a.m., July 18
For additions and impvs. of sewage disposal plant.—City Clk.
**Pa., Philadelphia** noon, July 18
For branch sewers, main sewer, test borings, and removal of plate girder bridge and wooden trestle.—F. H. Caven, Dir. Pub. Wks.
**Tenn., Nashville** 2 p.m., July 18
For const. section of interceptor sewer.—Bd. Pub. Wks.
**Wis., West Allis** July 19
For san. sewers, storm sewers, etc.—Bd. Pub. Wks.

## WATER SUPPLY

**Minn., St. Paul** 11:30 a.m., July 24
For cut stone, etc., c. i. pipe, steel and iron castings, and coal handling and conveying equip. for water dept.—H. W. Austin, Purch. Agt.
**Minn., Tracy** 8 p.m., July 17
For 1,600 ft. water mains.—Lester J. Fitch, City Recorder.
**Neb., Holdredge** 8 p.m., July 18
For watermains, etc.—W. Lindstrom, City Clk.
**N. J., Bloomfield** 8 p.m., July 17
For furn. c. i. pipe and special.—Donald F. Peck, Town Clk.
**N. J., Belleville** 8:45 p.m., July 18
For const. water mains and taps.—Bd. Town Comrs.
**N. Y., Manhattan** 11 a.m., July 21
For resand. filter beds and const. new filter beds at Mt. Kisco sewage disposal plant.—Nicholas J. Hayes, Comr. Water Supply, Gas and Elect., Mun. Bldg.
**N. Y., Peru** 2 p.m., July 19
For const. waterworks system.—Bd. Water Comrs.
**O., Cleveland** noon, July 21
For const. foundations at pumping station.—Comr. Purchases and Supplies.
**O., Columbus** July 18
For constr. c. i. water main.—S. W. Roderick, Market Exchange Bank.
**O., Sidney** July 27
For deep well pump and motor.—Frank Smith, Dir. of Service.
**O., Zanesville** July 19
For furn. 300 water meters.—K. J. Pollard, Sec'y, City Bd. Purchase.
**Pa., Ebensburg** 12 m., July 28
For constr. c. i. water line.—Herman T. Jones, Co. Controller.
**Pa., Erie** 1:30 p.m., July 21
For changes to boiler house superstructure and constr. steel coal bunker and appurt.—George C. Gensheimer, Sec'y, Com. Water Wks.

## DRAINAGE AND IRRIGATION

**Minn., Olivia** July 26
For constr. ditch.—A. O. Schmidt, Co. Aud.
**Mo., Trenton** 10 a.m., July 17
For drainage work in main and lateral ditch.—M. H. Mooney, Engineer, Trenton, Mo.
**Tenn., Memphis** 11 a.m., July 20
For const. 690,000 cu. yds. earthwork in White River Levee Dist.—Miss. River Com., Customhouse.

## FIRE

**N. J., North Bergen** July 20
For 750-gal. pumping fire engine.—Edw. A. Ryan, Twp. Clk.

## BRIDGES

**Ala., Montgomery** July 25
For const. bridges.—W. S. Keller, State Hwy. Engr.
**Cal., Riverside** 10 a.m., July 17
For const. pile trestle bridge.—Bd. Co. Supvrs.
**Ind., New Albany** 10 a.m., July 22
For constr. of bridge—John D. Mitchell, Co. Aud.
**Ind., Fowler** 1:30 p.m., July 18
For const. 4 bridges.—Sherman N. Geary, Co. Aud.
**Ind., Versailles** 1 p.m., Aug. 7
For rein. conc. bridges, $1,925.—W. D. Robinson, Co. Aud.
**Ia., Carroll** 11 a.m., July 26
For const. bridges and culvts.—Co. Aud.
**Kan., Larned** July 28
For constr. reinf. conc. bridge.—St. Hwy. Com.
**Ky., Frankfort** 1 p.m., July 19
For const. rein. conc. superstructures.—Joe S. Boggs, State Hwy. Engr.
**Mass., Boston** noon, July 24
For rebldg. pipe bridge.—Jos. A. Rourke, Comr. Pub. Wks.
**Mich., Menominee** 10:30 a.m., July 20
For 4 culverts.—H. I. Davies, Dist. Engr., Escanaba.
**Minn., Duluth** 1 p.m., July 28
For bridge work and repair.—Walter H. Borgen, Co. Aud.
**N. Y., Cobleskill** 1 p.m., July 21
For bldg. new steel and conc. bridge.—Town Clk.
**N. C., Raleigh** July 25
For const. bridges and culverts on state projects.—States Hwy. Dept.
**O., Bowling Green** 10 a.m., July 31
For 2 conc. bridges and 1 conc. abutment.—E. E. Coriell, Co. Aud.
**O., Sidney** June 23
For conc. bridge.—Frank Smith, Dir. Pub. Serv.
**O., Circleville** July 31
For const. 2 bridges.—T. D. Krinn, Co. Aud.
**Wis., River Falls** 7 p.m., July 20
For removal of present steel truss bridge and erect. steel bridge.—F. V. Williams, City Clk.

## MISCELLANEOUS

**D. C., Washington** 2 p.m., July 17
For const. incinerators for trash plant.—Comrs., D. C.
**Fla., Tampa** noon, July 26
For const. rein. conc. Wharf and transit shed foundation.—City Com.
**Fla., Port Tampa City** 8 p.m., Aug. 11
For constr. conc. seawall and dredging channel.—Mrs. R. E. Davis, City Clk.
**Ill., Chicago** 11 a.m., July 19
For creosoted wood blocks.—Chas. F. Francis, Comr. Pub. Wks.
**Ill., Chicago** 11 a.m., July 13
For 4 motor-driven centrifugal sump pumps.—Chas. R. Francis, Comr. Pub. Wks.
**Ky., Frankfort** 1 p.m., July 19
For 10-ton rd. roller with scarifier.—Joe S. Boggs, St. Hwy. Engr.
**Minn., Preston** July 18
For stone crusher and elevator.—J. Dunford, Co. Aud.
**N. Y., Manhattan** 10:30 a.m., July 21
For furn. shovels, picks and handles for St. Clean. Dept., and hydrant parts for Dept. Water Supply, Gas and Elect.—Bd. Purchase, Mun. Bldg.
**N. Y., Manhattan** 10:30 a.m., July 19
For pipe and pipe fittings.—Bd. Purchase, Mun. Bldg.
**N. Y., Manhattan** 10:30 a.m., July 19
For motor truck, repair parts for Holt tractors, solid rubber tires, Prestolite tanks and lamps, and ball bearings.—Bd. Purchase, Mun. Bldg.
**N. Y., Manhattan** 2 p.m., July 20
For 500 tons asph. pav. cement.—Julius Miller, Boro. Pres., Mun. Bldg.
**N. Y., Manhattan** 10:30 a.m., July 21
For portable air compressors, granite and wood pav. blocks pine, double nozzle fire hydrants, and elect. supplies, etc.—Bd. Purchase, Mun. Bldg.
**N. Y., Buffalo** 11 a.m., July 27
For const. rubble mount east breakwater ext. at Fairport Harbor, O.—U. S. Engr. Office.
**N. Y., New York** noon, Aug. 7
For dredging and rock removal in Bronx River.—U. S. Engr. Office, 39 Whitehall St.
**O., Columbus** noon, July 19
For 10,000 gals. Tarvia cold application.—W. H. Duffy, Pres. Bd. Purchase.
**O., Cincinnati** noon, July 18
For furn. crushed limestone, crushed bowlder mac. stone and screenings.—Ernst Von Bargen, City Purch. Agt.

# Work Contemplated

## STREETS AND ROADS

**Ala., Mobile**—Will issue $80,000 5% street bonds.

**Ark., El Dorado**—Paving Dist. No. 1—Issue of 6% 10½-year (average) paving bonds to the amount of $30,000.

**Ark., Texarkana**—Work on the new st. paving contr. on the Texas side of town will be started within two weeks. The amount to be expended is $250,000, and was provided for in a bond issue.

**Cal., Yuba Co.**—Contemplates the improvement of 100 mi. of primary roads within the next two years. It is proposed to complete the work without resort to a bond issue.

**Cal., Fresno**—The 8% semi-annual street improvement bonds to the amount of $23,199.40 sold.

**Cal., Lodi**—Plans improving portion of Eden St., $83,145 sq. ft. 1½-in. warrenite on 2½-in. asphaltic concrete, 91,425 sq. ft. concrete curb, 5,525 sq. ft. concrete gutters; portion of Flora St., 91,425 sq. ft. 1½-in. warrenite on 2½-in. asphaltic concrete, 100,126 sq. ft. grading, 5,620 lin. ft. concrete curb, 7,025 sq. ft. concrete gutters; portion of Stockton St., 77,352 sq. ft. 1½-in. warrenite on 2½-in. asphaltic concrete, 83,159 sq. ft. grading, 3,604 lin. ft. concrete curb, 4,505 sq. ft. concrete gutters.

**Cal., Oakland**—Had plans prepared improving 14th St. between Poplar and Wood Sts., 126,819 sq. ft. grading, 537 lin. ft. concrete curb with steel guard, 4,398 ft. concrete curb without steel guard, 5,266 sq. ft. concrete gutter, 21,553 sq. ft. asphaltic concrete pavement, etc.

**Cal., Fresno**—Plans improving portions Peralta Way and Moroa Aves., 70,645 sq. ft. grading, 61,060 sq. ft. asphalt, 6,145 sq. ft. concrete gutter, 1,760 lin. ft. concrete curb, 2,703 sq. ft. concrete sidewalks, etc.

**Cal., Los Angeles**—Bd. Supervs, Los Angeles Co., takes bids about Aug. 1, improving 105th, 106th, 107th and 109th Sts., Budlong, Normandie Aves., et al., 33,655 lin. ft. cement curbing, 2,720 sq. ft. cement gutter, 134,018 sq. ft. cement sidewalks, 19,085 cu. yds. earth excav.

**Cal., Modesto**—Had plans prepared improving Morris Ave. between McHenry St. and Blocks 605 and 606, Auburn and Castle Sts., between Morris and Lucerne Aves., 168,200 sq. ft. grading, 154,809 sq. ft. 1½-in. warrenite on 2½-in. asphaltic concrete, 13,390 sq. ft. concrete gutter, 8,325 lin. ft. concrete curb, 1,258 lin. ft. headers, etc.

**Cal., Newport Beach**—Rescinded contract for concrete paving 368,755 sq. ft. Central Ave., et al., $460,000. Will readvertise.

**Colo., Denver**—Broadway paving district to be created and will be one of the biggest "jobs" the city has done. Total cost, about $166,338. Broadway is the widest st. in Denver.

**Colo., Denver**—Ordinance to open, widen and extend Wewalta St.

**D. C., Washington**—The following Federal Aid projects have been approved by the Bureau of Public Roads, Washington, D. C. Information obtainable from that office on application.

Arkansas—Proj. No. 139, Pope Co., 4.489 mi., pen. mac., $79,735. Proj. No. 141, Conway Co., 8.430 mi., pen. mac., $174,128.

Colorado—Proj. No. 213, Montezuma Co., La Plata, 18.50 mi., gravel, $280, 170.

Georgia—Proj. No. 252, Cherokee Co., 5.50 mi., top soil, $41,228. Proj. No. 253, Oconee Co., 3 mi., top soil, $16,148. Proj. No. 256, Appling Co., 15.30 mi., sand clay, $94,162. Proj. No. 261, Glynn Co., 10.30 mi., clay gravel, $116,953. Proj. 270, Tift Co., bridge, $44,000. Proj. No. 279, Cook Co., 5.355 mi., gravel, $73,935; Proj. 280, Clayton Co., 4 mi., sand clay, $23,825.

Idaho—Proj. No. 50, Clearwater and Lewis Cos., 7.490 mi., G. and D., $112,-834.

Iowa—Proj. No. 178, Page Co., 15.850 mi., G. and D., $91,437.

Massachusetts—Proj. No. 79, Berkshire Co., 2.991 mi., bit. mac., $130,570.

Michigan—Proj. No. 88, Ingham Co., 3.116 mi., concrete, $160,252.

Minneapolis—Proj. No. 286, Ramsey Co., 1.220 mi., conc. or brick, $71,343.

Missouri—Proj. No. 189, Taney Co., 4.020 mi., G. and D., $17,020. Proj. No. 206, Ripley Co., 5.4 mi., G. and D., $23,-680.

Montana—Proj. No. 171, Madison Co., 7 mi., G. and D., $79,530. Proj. No. 179, Gallatin, .79 mi., gravel, $7,108.

Nebraska—Proj. No. 183, Douglas Co., 12.97 mi., G. and D., $53,460.

Nevada—Proj. No. 47, Humboldt Co., 3.33 mi., G. and D., $29,897.

New Hampshire—Proj. No. 148, Belknap Co., 1.91 mi., gravel surf. treated, $38,847. Proj. No. 149, Rockingham Co., 1.89 mi., reinf. conc., $66,550.

New York—Proj. No. 211, Montgomery Co., 1.5 mi., concrete, $56,000. Proj. No. 214, Lewis Co., 7.6 mi., bit. mac. or concrete, $304,000. Proj. No. 218, Greene Co., 3.87 mi., concrete, $134,400. Proj. No. 224, Sullivan Co., 1.26 mi., concrete, $45,000. Proj. No. 225, Steuben Co., 2.5 mi., concrete, $79,400. Proj. No. 227, Franklin Co., 8.6 mi., bit. mac. or concrete, $344,000. Proj. No. 229, Steuben Co., 4.2 mi., bit. mac., $168,000.

North Carolina—Proj. No. 148, Buncombe Co., 7.6 mi., hard surf., $304,123.

Ohio—Proj. No. 187, Columbiana Co., 2.324 mi., brick, bit. mac. or bit. conc., $107,000.

Rhode Island—Proj. No. 14, Washington Co., 1.8 mi., bit. mac. or reinf. conc., $107,537.

South Carolina—Proj. No. 164, Pickens Co., 6.978 mi., top soil, $87,796. Proj. No. 172, Horry Co., 11.821 mi., sand clay, $45,306.

South Dakota—Proj. No. 94, Spink Co., 14.38 mi., G. and D., $49,104. Proj. No. 98, Lincoln Co., 11.9 mi., gravel, $68,809. Proj. No. 104, Douglas Co., 6.6 mi., graded, $17,580.

Vermont—Proj. No. 26, Caledonia Co., 4.79 mi., gravel, $114,840.

Virginia—Proj. No. 151, Pulaski Co., Wythe, 10.31 mi., surf. treated W. B. mac., $185,854.

Washington— Proj. No. 102, Pierce Co., 3.23 mi., concrete, $97,225.

Wyoming—Proj. No. 127, Fremont Co., 9.364 mi., Sel. material, $77,726. Proj. No. 134, Laramie Co., 5.538 mi., Sel. material, $34,650.

**Fla., Jacksonville**—Decided impvts. on Warrington Ave.

**Fla., St. Augustine**—The road from the east end of the island bridge to St. Augustine beach will be built from funds from sale of time warrants. The resolution offering for sale $80,000 worth of time warrants. The Comrs. will at once build the road from the bridge to St. Augustine Beach; the Lewis Speedway; the widening and improvement of the road from the city limits to the St. Augustine golf links; the road to Evergreen Cemetery and the road to Lewis Point.

**Fla., St. Lucie Co.**—Messrs Spitzer, Rorick & Co. of Toledo successful bidders for the 6% road bonds to $50,000.

**Fla., Dode Co.**—To vote $1,800,000 bonds for const. 8 mi. new hgwy. and erect new Co. jail.

**Fla., Hillsburgh Co.**—To issue $3,000,-000 bonds to build hard surfaced hgwy.

**Fla., Tampa**—Resolution for $3,000,-000 for hard surfaced hgwys. and for an election issuing said bonds.

**Fla., Orlando**—Paving of rd. through Orange Co. west to Lake Co. line started. There will be an 18 mile stretch reaching the Lake Co. line through Ocoee, Winter Garden and Oakland. That part of the old road from Orlando to Oakland will be relaid and widened 7 ft. and the remainder to the west line of the county will be entirely new. This will give a splendid 16-ft. road to the west.

**Fla., Fort Pierce**—Improvement of Dixie Hwy. south of Fort Pierce to bring the road up to standard construction and 16 ft. width resumde. Ten miles are still to be improved south of Fort Pierce and 6 miles north, between Jones Hill and Vero.

**Fla., Avon Park**—With the sale of the Avon Park street and park improvement bonds at $75,000 work on paving 4 mi. of streets within the city limits will be rushed. Railroad St. from Church to Main; Walnut, from Fairfield to Forrest; Highland Ave., from Verona Circle to Wintrop St.; Winthrop St., from Highland Ave. to Lake Ave.; Pleasant, from Central to Florida Ave.; DeSoto, from Pleasant to Canfield; Canfield, from Central to Anoka; Walnut continued to Fairfield; Fairfield Ave. from Cornell to city limits; Lotela, from Cornell to Lake Lotela; Michigan, from Maine to Church, and Church to Railroad Ave. And the following with asphalt: Add 4 ft. to Central St., south of Main, making 16 ft.; Central continued to State St.; Tulane Circle, from State to Lake Ave.; adding 7 ft. to present 9 ft. part of Lake Ave.; North Main St., from Lake Ave. to Railroad and intersections; Main St., from bathhouse to Highlands Ave., making 16 ft. wide, and adding curbing and gutter; Highlands Ave., from Main St. to Verona Circle; Pleasant St., from Railroad to Central Ave.; Central Ave., from Pleasant to Main; Church St., from Verona to Forrest; Forrest Ave., from Main St. to Pleasant Ave.; adding 7 ft. to Main St., from Central to DeSoto.

**Ill., Palestine**—Plans drawn for conc. road paving to cost $25,000 in Palestine.

**Ind., Indianapolis**—Impv. res. Wiscasten St. to Meridian Ave., grad., pav. with cement.

**Ind., Indianapolis**—Sheffield Ave improvement resolution for grad. and pav., wooden blocks, asphaltic conc. or brick.

**Ind., Indianapolis**—Impvt. res. for Ruckle St.

**Ind., Indianapolis**—City to improve Bolton Ave. by grad., pav., laying curbs and drains, etc.

**Ind., La Porte Co.**—Sale of $16,400 bonds for gravel for rds.

**Ind., Mont Co.**—Bond sale of $5,000 for hwy. impvt. in Co.

**Ind., Indianapolis**—Impv. res. to grade and pave rdway. of Winthrop Ave. with blocks, asphalt, conc. or brick.

**Ind., Cass Co.**—Sale $59,200 highway improvement bonds, 5%, semi-annually.

**Ind., Dubois Co.**—Sale $28,000 highway improvement bonds, 4½%.

**Ind., Scott Co.**—$33,480 highway improvement bonds.

**Ind., Jackson Co.**—Highway improvement bonds, 5%. Salt Creek T. S.

**Ind., Perry Co.**—Sale $48,000 highway improvement bonds.

**Ia., Ames**—Drawing plans for rds. in various counties for State Hgwy. Comr., Ames.

**Ia., Albia**—Drawing plans for paving.

**Ia., Rockwell City**—Co. Comrs., R. B. Dixon, Rockwell City, contemplate graveling in Calhoun Co.

**Ia., Columbus Junction**—Drawing plans for paving for City Council.

**Ia., Oskaloosa**—Contemplate resurfacing and guttering.

**Ia., Des Moines**—Contemplate paving. K. C. Kastberg, Engr.

**La., New Orleans**—The Commission Council of City of New Orleans intends to provide for the paving and repaving of about 35 streets in the city and repaving 14 or more.

**Md., Baltimore**—City of Baltimore will proceed to pave, repave and resurface with improved pavements Kathland Ave., from WBL Granada Ave. to Old City Line; Granada Ave., from SBL Springdale Ave. to NBL Forest Park Ave.; Hamilton Ave., from SBL Gwynn Oak Ave., to NBL Hampshire Ave.; Springdale Ave., from SBL Hamilton Ave. to WBL Hillsdale Ave.; Halcyon Ave., from WBL Harford Ave. to WBL Eloise Ave.; Southern Ave., from WBL Harford Ave. to WBL Eloise Ave.; Thirty-third St., from ECL Ellerslie Ave. to WCL Snowdown Ave. (widening).

**Md., Baltimore**—City to improve and pave Kathland Ave., from WBL Granda Ave. to Old City Line; Granada Ave., from SBL Springdale Ave. to NBL Forest Park Ave.; Hamilton Ave., from SBL Gwynn Oak Ave. to NBL Hampshire Ave.; Springdale Ave., from SBL Hamilton Ave. to WBL Hillsdale Ave.; Halcyon Ave., from WBL Harford Ave. to WBL Eloise Ave.; Southern Ave., from WBL Harford Ave. to WBL Eloise Ave.; 33d St., from ECL Ellersile Ave. to WCL Snowdown Ave., widening. By order of the Paving Commission of Baltimore City.

**Md., Kent Co.**—The Third National Bank of Chestertown awarded an issue of road bonds of $21,000.

**Maine.**—Impv. to Lafayette National Park and building a road up Green Mt. Cost, about $100,000.

**Mass., Quincy**—An issue of street bonds of $10,000 authorized by the City Council.

**Mass, New Bedford**—Proposes to lay permanent pavement in Sycamore St., from County to Summer Sts.; Reed St., from Allen to Ryan Sts.; North St., from Summer to Chestnut Sts.; Myrtle St., from Adams to Sawyer Sts.; Potter St., De Wolf to Shawmut Ave.; Chestnut St., North to Mill Sts.

**Mich., Ypsilanti**—Plans drawn for paving for City Council.

**Mich., Lapeer**—Finishing plans for road in Lapeer Co. for Co. Comrs. E. H. Gould, Engr., Lapeer.

**Mich., Flint**—Co. Comrs. contemplate paving and widening in Fenton, Mich.

**Mich., Grand Rapids**—Res. for grading and paving with reinforced concrete Courtney St. from Valley to Frederick Aves. Grading and paving with sheet asphalt on a concrete base Sigsbee St. from Eastern Ave. to Fuller Ave. Grading and paving with sheet asphalt on the present base, Sigsbee St. from Fuller Ave. to Ethel Ave. Grading and paving with brick on a concrete base, Bridge St. from Valley Ave. to Scott Ave. Grading and paving with sheet asphalt on a concrete base, Bridge St. from Scott Ave. to the West city limits, including the construction of the necessary curbs, gutters, manholes, catch basins, storm water sewers, sewer laterals, water services, concrete sidewalks and approaches.

**Mich., Grand Rapids**—Director of Public Service recommended that the hearings on the 250 streets it is proposed to include in next year's program be begun July 20 to give the department lots of time to complete its program and advertise for bids about January 1.

**Mich., Lansing**—Bids by State Hgwy. Dept., Frank F. Rogers, Lansing, to July 14, 18, 19 and 17, for roads in various counties.

**Mich., Grand Rapids**—Res. to grad. and pav. with sheet asphalt on a conc. base Collins Ave., from Griggs St. to Burton St., including the constr. of the necessary curbs, gutters, manholes, catch basins, storm water sewers, sewer laterals, water services, conc. sidewalks, approaches.

**Minn., St. Paul**—Bids will be received Aug. 1 and 2 for 31 State hwy. jobs, including grading, graveling, bridges, culverts and paving. The estimated cost of all of these various jobs is $1,200,000.

**Minn., St. Paul**—Res. for pav. Grand Ave. from Milton St. to Cretin Ave.

**Minn., St. Paul**—Res. to pave Hague Ave. from Lex. Ave. to west line Syndicate Ave.; to grade and pave Hindsar Rd. from Pt. Douglas Rd. to city limits.

**Minn., St. Paul**—To open, widen and extend Stanford Ave. to width 66 ft. to Hanline Ave.

**Minn., Crookston**—Polk Co. awarded to Minnesota Loan & Trust Co., N. W. Bank Bldg., Minneapolis, $150,000 co. rd. bonds.

**Minn., St. Paul**—To pave Norris St. from Temperance St. to Canada, including new sewer, water and gas connections.

**Minn., St. Paul**—Proposal to grade Cecilia Pl., const. curbs on Niles St. and Hyacinth St., a cement sidewalk on Hyacinth St.

**Minn., St. Paul**—Proposals for impv. 6th St., Crowell Ave. and alleys in Dawson's "Earle Addition."

**Mo., Kansas City**—Pav. res. adopted for Tracey Ave., from 58th to 59th St., with Portland cement.

**Mo., Kansas City**—To improve alley, Laurence Ave., alley next to Tracy Ave., both sides Donnelly Ave., Messington Ave., Chestnut Ave., repair Jefferson Ave., grad. Broadway and various other streets in city.

**Mo., Kansas City**—Res. to repair asphalt pav. on Belleview Ave., from Roanoke Park to Valentine Rd.

**Mo., Kansas City**—Res. to construct conc. sidewalk west side Monroe Ave.

**Mo., Kansas City**—City Council passed paving resolutions for Mersington Ave. from 16th to 17th Sts., full width, Portland cement.

**Mo., Kansas City**—To change grade on alley between Lawrence Ave. and Fillmore St., Mill Creek Parkway to Central St.

**Mo., Kansas City**—Paving res., 14th St. W. of Campbell to Parea; Prospect Ave., 12th St. from Euclid to Prospect, Virginia Ave. from Independence Ave. to Bonle Ave., Ewing Ave. from 15th to 18th Sts.

**Mo., Kansas City** — Paving res., Tracy St. from 58th to 59th St., Jefferson St. from 35th to 38th Sts., Chestnut Ave. from N. line 44th to 45th Sts.

**Mo., Kansas City**—Council authorizes Bd. Public Works to repair and maintain about 80 sts in the city and curb and pave others.

**N. J., Camden**—Ordinance for widening Benson St. from Sixth St. to Broadway.

**N. J., Jersey City**—Plans and specifications for widening of Boulevard, from Newark Ave. to Tonnele Ave., Jersey City, accompanied by maps in detail, been submitted to the Board of Freeholders by A. Burton Cohen, Consulting Engr., and will probably be accepted at the meeting of the Freeholders.

**N. J., Newark**—Belleville Ave. and Bloomfield Ave. opening and widening; High St. opening and widening; Park Pl. opening and widening; retaining wall (Passaic St.).

**N. J., Newark**—Goodwin Ave. grading, curbing and flagging; Belgium St. paving and Silver St. paving and repaving.

**N. J., Newark**—An ordinance to provide for the opening and widening of Chancellor Ave. from Elizabeth Ave. to the city line to a total width of 80 ft. Adopted Sept. 16, 1920.

**N. J., Riverside**—Riverside wants a curb-to-curb pavement from the Bank Building to St. Peter's Church on Scott Ave., and for about six squares on Pavilion Ave., which is the beginning of the Bridgeboro Rd.

**N. J., Bridgeboro**—Bridgeboro wants a curb-to-curb pavement for 300 ft. in the direction of Riverside, and for about four blocks on the main street toward Moorestown. The county will pay for an 18-ft. strip through the curb-to-curb improvement an Riverside Twp. and Delran Twp. will do the rest.

**N. J.**—Under the apportinoment to be made to the various States for the fiscal year which began July 1 New Jersey will receive $628,581 of Federal Aid.

**N. J., Camden**—The ordinance for the widening of Mechanic and South Second Sts. and the condemnation of property in line with the approach to the new terminal and ferryhouse of the Reading Railroad passed.

**N. Y., Boro. Queens**—Plans changing lines of street system in territory bounded by Rockaway (Rd.) Blvd., Liberty Ave., 95th St. (Chester Ave.), 108th (Byrne) Ave., 96th St. (Van Wicklen Place), Sutter Ave. (Bell Place), 93d St. (Woodhaven Ave.) and 94th St. (Walker Ave.) Boro. of Queens (Cal. No. 8).

**N. Y., Boro. Queens**—Changing the grades of the street system in the territory bounded by 198th (Irvington) St., 99th (Atlantic) Ave., 202d (Peekskill) St. and 104th (Beaufort) Ave., Boro. of Queens.

**N. Y., Boro. Bronx**—Changing the lines and grades of the street system in the territory bounded by Kingsland Ave., Waring Ave., Gunther Ave., Mace Ave., Demeyer St., Vance St., Stillwell Ave., Baychester Ave., Hilder Ave. and the Bronx and Pelham Parkway. Easterly block length of Bogart Ave. between Neill Ave. and Brady Ave., Boro. of the Bronx. Establishing lines and grades for Miriam St. from Grand Blvd. and Concourse to Valentine Ave.; by East 170th St., Jerome Ave., East 172d St. and Grand Blvd. and Concourse, Boro. of the Bronx.

**N. Y., Boro. Brooklyn**—Changing the grade of East 2d St., from Elmwood Ave. to Ave. I, Boro. of Brooklyn.

**N. Y., Boro. Manhattan**—Resolutions passed for curbing, recurbing, flagging, reflagging and paving with asphalt (permanent pavement) West 163d St., from Fort Washington Ave. to Riverside Drive. This resolution affects one block or about 500 feet of West 163d St. "Regulate, curb and recurb, flag and reflag and pave with a permanent sheet asphalt on a concrete foundation, the roadway of Isham St., from Broadway to Park Terrace West, together with all work incidental thereto."

**N. Y., Feeny**—Ordinances for paving Sage Ave. and Eaton Rd. and constructing sidewalks in both streets adopted.

**N. Y., Albany**—A hearing given on the proposed paving of Vliet St. from Egbert to Garner St.

**N. Y., Rochester** — Const. cement walks on each side of Edinburgh street from Plympton avenue to Exchange street. Estimated expense $1,200..

**N. Y., Rochester**—The construction of a pavement in Knickerbocker avenue, from Sunrise Park to Dewey avenue; also the construction of a sewer in Knickerbocker avenue, from Sunrise Park to Dewey avenue. Estimated expense, $21,700.

**N. Y., Rochester**—The construction of a pavement in Otis street from the end of present pavement to Burrows street; also the construction of a sewer from end of present pavement to Burrows street. Estimated expense, $12,600.

**N. Y., Rochester**—The improvement of Bay street from Portland avenue to Webster avenue by resurfacing from Webster avenue to Hebard street and the construction of a new pavement from Hebard street to Portland avenue, also the construction of the necessary sewers between Hebard street and Portland avenue. The pavement and resurfacing to be of Warrenite Bitulithic. Estimated expense, $115,000.

**N. Y., Rochester**—The construction of cement walks on each side of Britton rd, from Lake avenue to west line of lots 31-32, together with the necessary grading. Estimated expense, $3,700.

**N. Y., Rochester**—Two new ordinances will be introduced, covering the proposed asphalt pavement in Arbordale street and an asphalt pavement in Aab street.

Ordinances to pave Edinburgh street walks between Plymouth avenue and Exchange street, $1,200; Knickerbocker pavement and sewer between Sunrise park and Dewey avenue, $21,700; Knickerbocker avenue, Avis street, and Pullman avenue storm water outlet sewers, $80,000; Emerson place sewers from Santee street to the end of Emerson place, $1,550; Otis street asphalt pavement, from end of present pavement to Burrows street, $12,000; amendment to final ordinance providing for Bay street pavement resurfacing between Portland and Webster avenues and construction of a new pavement beginning at Hebard street and the necessary sewers, all at an estimated cost of $155,000; Huron and Meriden street, $3,300; Britton road walks and grading, $3,700; Plymouth avenue north pavement between Main and Commercial streets, $46,000; Upton park pavement resurfacing, $10,500; Curlew streets care and embellishment $75; Lake avenue care and embellishment between Glendale park and Driving Park avenue, $50; Dewey avenue asphalt pavement between Driving Park avenue and Augustine street, $74,000; Bronson avenue pavement resurfacing between Jefferson avenue and Genesee street, $18,600; Penn street asphalt pavement, $11,400; Churchlea place pavement resurfacing, $5,150; Brunswick streets pavement resurfacing, $7,150; Averill avenue pavement resurfacing between Mt. Hope avenue and Clinton avenue south, $27,000; Rugraff street asphalt pavement, $17,000; Collingwood drive tree planting, $330; Rutledge drive tree planting, $24; Navarre road tree planting, $330; Townsend street asphalt pavement between Van Stallen street and Norton street, $6,550; La Mont place asphalt pavement, $6,500 Raeburn avenue walks and grading, $1,350; Stanfield terrace tree planting, $90; amendment to Chatham street sewer and asphalt pavement, $45,000.

The proposed extension of Clifton street will be taken up by the council for consideration.

**N. Y., Manhattan**—Acquiring title to the lands necessary for Underhill Ave. from Randall Ave. to Sound View Ave.

**N. Y., Boro. Bronx**—Res. adopted, paving with bituminous concrete on a cement concrete foundation the roadway of Leland Ave. from E. 177th St. to Westchester Ave., furnishing and adjusting curb and sidewalks, building and rebuilding inlets and receiving basins, together with all incidental work.

**N. Y., Seneca Falls**—$43,000 bond issue; funds will be used to pave streets of Seneca Falls; voted by taxpayers.

**N. Y., Boro. Bronx**—Regulating, grading, setting curb, laying sidewalk and crosswalks, building inlets, receiving basins, drains, culverts, approaches and guard rails where necessary in Paulding Ave. from Esplanade to Bogart Ave., and Bogart Ave. from Paulding Ave. to Pelham Parkway South.

**N. Y., Boro. Bronx**—Paving with bituminous concrete on a cement concrete foundation the roadway of W. 238th St. from Cannon Pl. to Sedgwick Ave.

**N. Y., N. Y. City**—To replace 11 motor trucks; cost about $30,900.

**N. Y., Boro. Bronx**—Paving with bituminous concrete on a cement concrete foundation the roadway of Melville St. from Morris Park Ave. to New York, New Haven & Hartford Railroad, furnishing curb and sidewalks, building and rebuilding inlets and receiving basins.

**N. Y., Boro. Bronx**—Paving with bituminous concrete on a cement concrete foundation (preliminary pavement) the roadway of Van Nest Ave. from existing pavement at Victor St. to Van Buren St., furnishing and adjusting curb and sidewalks, building and rebuilding receiving basins.

**N. Y., Boro. Bronx**—Regulating, grading, setting curb, laying sidewalks and crosswalks, building inlets, receiving basins, drains, culverts, approaches and guard rails where necessary in West 195th St. from Jerome Ave. to Reservoir Ave., together will all work incidental thereto.

**N. Y., Boro. Queens**—Board of Estimate plans changing lines and grades of Roosevelt Ave. between Flushing River and Lawrence St., and by changing the lines of Roosevelt Ave. (Amity St.-40th Ave.) between Joe Place and Main St., in the Boro. of Queens.

**N. Y., Boro. Queens**—Plans change in territory within Nashville Ave. (Lincoln Rd.-Armida Ave.), 212th St., 110th Ave. (Queens Parkway), Springfield (road) Blvd., 113th Ave. (The Strand), boundary line of the City of New York, 121st Ave., 231st St., 129th Ave., 226th St., 130th Ave. and Sears (Vorhis) St., Boro. of Queens.

**N. Y., Boro. Brooklyn**—To regulate, pave and improve 76th St., from 20th Ave. to 21st Ave.; grading, curbing and flagging 88th St., from Ridge Blvd. to Shore Rd.; paving 77th St., from 18th Ave. to 19th Ave.; grading, curbing and flagging 78th St., from 14th Ave. to 15th Ave.; paving 88th St., from Ridge Blvd. to Shore Rd.; grading, curbing and flagging Ave. H, from East 35th St. to Brooklyn Ave., Boro. of Brooklyn; grading, curbing and flagging (Cal. No. 48).

**N. Y., Boro. Bronx**—11 resolutions adopted by the local boards of the Van Cortlandt and Chester Dists., Boro. of the Bronx, initiating proceedings for local improvements, as (1) grading, curbing and flagging where necessary, and paving with asphalt (permanent pavement) Grand Ave., from West 181st St. to West Fordham Rd.; (2) grading, curbing and flagging East 227th St., from Laconia Ave. to Bronxwood Ave.; (3) grading, curbing and flagging Hobart Ave. from Roberts Ave. to Buhre Ave.; (4) grading, curbing and flagging Robert Ave., from Westchester Ave. to Eastern Blvd.; (5) grading, curbing and flagging Mahan Ave., from Middletown Rd. to Westchester Ave.; (6) grading, curbing and flagging Gainsborg Ave., from Roberts Ave. to Morris Park Ave.; (7) grading, curbing and flagging Crosby Ave., from Middletown Rd. to Westchester Ave.; (8) grading, curbing and flagging Buhre Ave., from Westchester Ave. to Eastern Blvd.; (9) grading, curbing and flagging Jarvis Ave., from Roberts Ave. to Buhre Ave.; (10) sewer in Tyndall Ave., from West 261st St. to West 263d St.; (11) grading, curbing and flagging Godwin Terrace, from West 230th St. to West 231st St.

**N. Y., Rochester**—The resurfacing of Bronson Ave., from Jefferson Ave. to Genesee St. with asphalt. Estimated expense, $18,600.

**N. Y., Rome**—$106,885.58 worth of paving approved for Rome streets.

**N. Y., Hebron**—An issue of 6%, 18½-year (average) highway bonds to the amount of $25,000.

**N. Y., Boro. Brooklyn**—Local board resolutions, initiating proceedings for the following local improvements: (a) regulating, grading, curbing and flagging 56th St., from 11th Ave. to 12th Ave.; (b) sewer in Albany Ave., from Linden Ave. to Church Ave.; (c) sewer in East 42d St., from Snyder Ave. to Holy Cross Cemetery; (d) regulating, curbing and paving with permanent asphalt Ave. I, from Ocean Parkway to Coney Island Ave.; (e) regulating and paving with permanent asphalt, Ave. R, from East 14th St. to East 15th St.; (f) regulating, curbing and paving with permanent asphalt, East 19th St., from Ave. O to Ave. P; (g) regulating and paving with permanent asphalt, Hegeman Ave., from Louisiana Ave. to Williams Ave.; (h) regulating and paving with permanent asphalt, 56th St., from 11th Ave. to 12th Ave.

**N. Y., Rochester**—The construction of a pavement in Penn St., from Jefferson Ave. to Reynolds St. Estimated expense, $11,400.

**N. Y., Rochester**—The resurfacing of Churchlea Place, from Main St. West to Clifton St., with asphalt. Estimated expense, $5,150. The resurfacing of Brunswick St., from East Ave. to Milburn St., with asphalt. Estimated expense, $7,150. The resurfacing of Averill Ave., from Mt. Hope Ave. to Clinton Ave. South, with asphalt. Estimated expense, $27,000.

**N. Y., Syracuse**—Ordinances, ordering six more paving jobs to cost approximately $165,000, were introduced in the Common Council.

**N. C., Lexington**—A recent election favor of an issue of street bonds to the amount of $85,000.

**N. D., Minot—Pav. improvs** — Contemp. water proofing of blk. pav.

**N. D., Fargo—Sidewalks**—City Comn ordered constr in 11 addns.

**N. D., Rider—Road**—Contemp. extend Parks Hgwy to Cooperstown and E part of state.

**N. D., Granville**—Grad., Repair — City council auth. on various sts.

**N. D., Bismarck—Grad., Surf**—St. Hgwy. Comsn. decide to complete abt 295 mi. grad. and 32 mi. surf. in state this yr.

**Ohio, Columbus**—The elimination of the Dennison Ave. grade crossing, Columbus, may be begun this year. The city's share of this improvement is estimated at $250,000.

**Ore., Pendleton**—Approval of resolution for 15 blocks of paving voted. Pendleton is practically assured of nearly a mile and a half of pavement to be laid this summer.

**Ohio., Norwalk**—East Main St. ordinance passed.

**Ohio, Toledo**—Bond issue of $125,000 placed for the purpose of completing the improvement of Summit St. by opening, widening and extending the same from Perry St. to Broadway.

**Ohio, Toledo**—City holds bonds, value $12,000, for extending and widening Central Ave. to Elm St.

**Ohio. . Elyria**—North Ridge—Close rd., 1.7 miles, commissioners advertising for bids for all slag with asphalt penetration top, and sandstone with sandstone penetration top.

**Ohio, Cleveland**—The paving projects pending: Columbus, 27 roads involving 61 miles of highway to be repaired this summer by county comns. with tar and asphalt. Estimated, $58,-595.

**Ohio, Cleveland**—Short, Crossview and Chestnut rds. in Independence township and village.

**Ohio, New Philadelphia**—Five streets and four alleys, work to begin about August 1, bond ordinance for $96,000 must be reenacted.

**Ohio, Fremont**—Ten roads, grading and where necessary to make even surface placing crushed stone and screenings.

**Ohio, Xenia**—North Detroit st. extension. City commission approves plans by W. W. Foster, engineer, Dayton, O.

**Ohio, Medina**—Gravel rd. at Granger. 2½-mi., 12 ft. wide. Cost, $6,250.

**O., Toledo**—Bond issue of $12,000 for opening, extending and widening Central Ave. from W. Line Krang's addition Elm St.

**O., Cleveland**—To issue notes to be known as "street improvement notes" in the sum of $45,000 for the purpose of paving streets; $6,800 for the purpose of paving E. 113th St., from Kinsman Rd. S. E. to Regalia Ave. S. E.

**O., Toledo**—Bond issue of $5,000 to complete impv. of Summit St.

**O., Cleveland**—An ordinance for the improvement, draining, setting curbs, paving with brick on conc. or brick on sand and improving W. 9th St., from Brayton Ave. S. W. to Fruit Ave. S. W.

**O., Cleveland**—Proceed with improvement of W. 73d St., between Wakefield Ave. N. W. and Franklin Ave. N. W., by grading, draining, curbing, paving with brick on conc. or bituminous conc. on conc.

**O., Springfield** — Dayton-on-Lake View Rd. from New Carlisle, State job, contract cancelled.

**O., Marietta** — Marietta-Cambridge Rd. to be advertised and not done by force account, 9½ mi.

**O., New Philadelphia**—Mistake in specifications as to width on Dover-Zoarville-Canton Rd. prevents award of $22,750 in bonds. Comrs. will try to untangle difficulty.

**O., Waverly** — Denver-Summit Rd. bids rejected. Co. Aud. will readvertise.

**O., Norwalk**—Peru Rd., 3 mi., conc. 10 ft. wide, Comrs. decide to pave.

**O., Columbus**—Dublin Ave., 1½ mi., Comrs. vote to improve with bituminous bound macadam 24 ft. wide.

**O., Cincinnati**—New street around Fairview Hillside to connect W. McMicken and McMillan Sts. $60,000 bond issue to secure right of way.

**O., Cuyahoga Falls**—Hillcrest and Gorge Ave., City Engr. to prepare plans for grading, sidewalks and slag, also for sidewalks Myrtle, High, Cole and Brick Sts.

**O., Lima**—Delphos-Ft. Jennings Rd., Comrs. as State Hgwy. Dept. for estimate, also as state aid.

**O., Barbarton**—High St., resurfacing, estimate of cost by Service Director W. C. Baylor, $12,470.

**O., Sabina**—Washington St., $10,000 bond issue upheld.

**O., McComb**—Plans and specifications have been prepared for paving Todd St. and South St. by Carl J. Simmon, Civil Engr., Van Wert, O.

**O., Galion**—Lincoln Hgwy., west of Leesville, 1.69 mi., Co. Comrs. want bituminous macadam, State Highway wants brick, also wants county to pay $51,000 out of $81,000. Looks like deadlock.

**O., Arlington**—Main St., a part of Findlay-Kenton Hgwy., Hancock Co., will issue $6,500 in bonds for its share of cost.

**O., Tiffin**—S. Washington St., repair and Melissa, Boehler, Tomb and Second Sts. paving, $37,000 city's share; bond issue to be submitted Aug. 8.

**O., Findlay**—N. Main, S. Main and W. Sandusky Sts., resurfacing ordinance passed.

**O., Cincinnati**—An ordinance for the improvement of Scott St. Engr. places the cost of improvement from 6th to 20th Sts. at $69,000.

**O., Cincinnati**—The ordinance for the improvement the street between 6th and 13th Sts. Estimates of the cost: concrete, $30,783; rock asphalt, $27,-634.75; wood block, $44,327.66.

**O., Conneaut**—Monroe St. paving ordinance tables. Whitney Rd. Co. Comrs. will help pay cost. Jackson St. council refuses to straighten it.

**O., Springfield**—Yellow Springs Pike residents want macadamized hard surface road. Comrs. considering. Wm. Sieverling, Co. Surveyor.

**O., Urbana**—Madison Co. Hgwy. joint improvement with Campaign Co. going forward.

**O., New Comerstown**—State St. from River St. west to corporation line contract to be let July 14.

**O. , Newark**—Utica-Martinsburg Rd. improvement, joint Knox and Licking Co. job, $43,000, will invite bids immediately.

**O., Bowling Green**—M. F. Thompson stone road, Middleton Twp., hearing by Comrs. July 13; also Wm. Wahl stone road, same two, hearing July 10.

**O., Lima**—17 sts., bids to be opened between July 20 and Aug. 11, $175,000. Vaughn C. Miller, City Engr.

**O., Warren**—Everett-Cortland Hill Rd., $104,000; Kennedy Warren Rd., $42,000, bonds sold for both roads by Co. Comrs.

**O., Cleveland**—Ordinance to pave, grade, drain and set curbs, Grovewood Ave., N. E. from E. 156th to E. 161st Sts.

**O., Akron**—Ordinance to improve Orlando Ave. from South Maple St. to Delia Ave., by grading, draining, curbing, paving, constructing sidewalks.

**O., Ironton**—Six improved mi. from here to Portsmouth to be sold July 14.

**O., Akron**—To improve Middlebury St. from McNaughton St. to Buchtel Ave., by grading, draining, curbing, paving, constructing sidewalks, planting shade trees, and constructing sewer laterals and water service connections.

**O., Cleveland**—Ordinance to improve E. 122d St. from Miles Ave. to Puntas Ave.

**O., Cleveland**—Ordinance to improve Lamontier Ave. from Woodhull to E. Bone.

**O., Dover**—Three sections of Main Market Rd. No. 70 between Dover and Zoarville and between Mineral City and Sandyville will probaly not be let until July 14 or later as a result of failure to get proceeds from the $200,750 bond issue sold. Section P-2 of the Newcomerstown Uhrichsville Rd., also advertised for today by the State Hgwy. Dept., will probably be readvertsied.

**O., Fremont**—Drawing plans for resurfacing for City Council. F. C. Kelkin, Aud., City Hall.

**O., Findlay**—Drawing plans for road impv. in Hancock Co. for Bd. of Co. Comr.

**O., Circleville**—Bids by Bd. of Co. Comr., O. E. Meyers, Clk., Court House, Circleville, for grading and paving to cost $41,500 in Pickaway Co.

**O., Akron**—Resolution to improve Glenwood Ave. from Montrose Ave. to Dan St., by grading, constructing sidewalks and constructing sewer laterals.

**Pa., Germantown**—To open Sixty-eighth Ave., from Ogontz Ave. to Limekiln pike, and Wyncote Ave., from Sixty-sixth Ave. to Ogontz Ave.

**Pa., Germantown**—Bill to place the following streets on the city plan: Roanoke St., of the width of fifty feet, from Moreland to Springfield Ave.; Durham St., fifty feet, from Lincoln Dr. to Emlen St.; Wellesley Rd., fifty feet, from Lincoln Dr. to Emlen St.; Howard Ter., thirty feet, from Mount Airy Ave., northwestwardly a distance of about 162 feet to a dead end.

To appropriate $1,200 for the improvement of the triangular space at Chelten Ave. and Wister St., formerly Stenton Ave. This is to be the site of the East Germantown war monument.

**Pa., Germantown.**—To pave Winston Rd., from Springfield to Willow Grove Ave., Chestnut Hill.

To repave Wister St., from Germantown Ave. to Wakefield St.; and Collom St., from Germantown Ave. to Wakefield St.

To grade Wyncote Ave., from Stenton to Sixty-sixth Ave.; Twenty-first St., from Sixty-fifth to Sixty-sixth Ave.; Eightieth Ave., from Chelten Ave. to Sharpnack St.; Seventy-ninth Ave., from Chelten Ave. to Sharpnack St.; Uber St., from Sixty-sixth to Sixty-seventh Ave.

**Pa., Erie**—The bonds will be issued for the following projects in the stated amounts: $21,000 for grading private property in the vicinity of Academy high school; $23,000 for constructing the most necessary portions of a relief intercepting sewer in the Mill Creek Valley; $11,000 for the erection of a viaduct over Mill Creek in Glenwood Park Ave.

**Pa., Red Lion**—An ordinance for an issue of $16,000 worth of bonds to pay for the borough's share of street paving was decided to place the matter of increasing the borough indebtedness by $90,000 for other street improvements before the voters.

**Pa., College Hill**—Sealed bids until July 18, at 8 p. m., for the following coupon bonds: Street impv., $60,000.

**Pa., Erie**—Mill Village to have new highway to Polloch Bridge.

**Pa., Erie**—Completion of rd. soon, in Edinboro and Washington Twps.

**Pa., Philadelphia**—Contract ordinances for street and sewer improvements to cost $160,000 submitted to City Council by Public Works Director. Early action on the street improvements is necessary. Construction of main trunk sewer on Spring Garden Ave., from Columbus to Quarry Sts., estimated cost $45,000; repaving of Hamilton Ave., from Fifth to North Braddock Aves., estimated cost $64,-000; repaving of East St., from Royal to Milroy Sts., estimated cost $35,000; construction of sewers on Biggs and Rising Main Aves., $5,000; repaving of Bryant St., from Heberton to Winterton Sts., $10,000.

**Pa., York**—The ordinance for paving of street from east side of Main to west side of Water St.

**Pa., Sharon**—Ordinance passed authorizing $35,000 street repaving and $19,500 sewer construction bonds.

**Pa., Erie**—Two major paving projects authorized in new ordinances. Both pavements will be constructed in south Erie. The first will be built in Elmwood Ave. from 26th to 31st St. and in 30th St. from Elmwood Ave. to Cascade St., at an estimated cost of $44,500. The second will be constructed in 25th St. from Peach to Chestnut Sts. The estimate cost of this improvement is $21,000.

**R. I., Pawtucket**—Resolution passed appropriating $9,000 for the improvement of West Bloomingdale Ave., from Smithfield Ave. to Power Rd., in the Fairlawn district.

**Ridgefield, N. J.**—An issue of street improvement bonds to the amount of $245,000 will be offered in the near future.

**Rogers Co., Okla.** (P. O. Claremore)—An election will be held on Aug. 1 to vote an issue of road bonds of $500,000.

**S. C.. Dillon**—Will sell $21,000 water and $8,000 sewer bonds.

**S. C., Greenville**—State Hgwy. Com., Columbia, S. C., will topsoil highway between Anderson St. and Dunham's Bridge.

**S. D., Sioux Falls—Pav.**—Res. adopted to pave 8th St., between Weber av. and Cliff Ave.; 2d Ave., between 10th St. S-C, St. P. M. & O. Ry.; 8th St., between Cliff Ave. and Asylum Ave. Portland cement concrete, bituminous concrete or sheet asphalt.

**S. D., Sioux Falls—Grad., Grav.**—Minnehaha and Moody Cos. Contemp. on rd. from Dell Rapids to Jasper. F. E. Ward, Sioux Falls, Aud., Minnehaha Co.

**S. D., Pierre—Road**—Hughes Co. Survey made of proposed rd. from Pierre to Gann Valley.

**S. D., Mitchell—Pav.**—Will pave E. 6th St. Bids in latter part of July. 6 blks.

**S. D., Flandreau—Grav.**—Moody Co. Contemp. on rd. bet. Egan and Pipestone rds.

**Tenn., Coffee Co.** (P. O. Manchester)—Voted in favor of $600,000 road bonds.

**Tex., Breckenridge**—Attorney, General, Austin, approved $330,000 street bonds.

**Tex., Brewster Co.** (P. O. Alpine)—Plans issuing $300,000 road bonds.

**Tex., Johnson Co.** (P. O. Cleburne)—Voted $225,000 road bonds.

**Tex., Boul**—Planned to connect E. Dallas sections; also to open Russell St. through to Laurel.

**Wash., Seattle**—The construction of the Quinault-Northside road planned at once by officials of the United States bureau of public roads and a call for bids from contractors has been issued. The work projected will consist of the construction of 4½ miles of highway in Grays Harbor county.

**Wash., Wenatchee**—The survey for the Blewett pass road improvement work is nearly completed, and bids will soon be advertised for by the county on this job. The county has $45,000 available from the road bond funds, and this will be expended in regrading the road from Peshatin Creek cross up as far as possible. The rest of the work will be done out of regular road funds. About 4 mi. of grading is included in the project, which will be completed this year. This will extend as far south as the Peshatin mill. There will still be about 2 mi. of grading to be done next year.

**Wash., Seattle**—City to improve Ferdinand St. from Rainer Ave. to Edmunds 42d St. S.

**Washington, Seattle**—Changes in Hi-System to be recommended to Legislature sanction are: From Crocker lake on the Olympic highway to Port Townsend; from Ocean Beach highway to Cathlamet, 2½ miles; Clarkston to Asotin, 12 miles; Goldendale to Buena, to connect the North Bank and Inland Empire highways, this being a slight change in route; Longmires to Slate creek to Lewis, connecting the Naches pass and Nation Park Highways and state road No. 5 so as to make a road clear around Mt. Ranier. A connection with the Columbia river ferry at McGowans by an extension of the Ocean Beach highway from Holman also is urged.

Two important improvements on the Pacific righway will come up next year

One changing the route between Tacoma and Seattle from the old valley road to the "high line" via Des Moines, which would be 10 miles shorter. Another would shorten the road between Bellingham and Ferndale where new paving is needed to replace an old county-built highway.

**Wash., Seattle**—Ordinance to improve Burke Ave., N. 3d St. from Wallingford, Ferdinand St. from Raimer Ave. to 42d St., Edwards St. to Hudson.

**Wash., Seattle**—Local improvement bonds issued for Terry Ave., 29th Ave., Southlake Ave., 10th Ave. and alleys.

**Wash., Seattle**—Resolution to improve Dist. No. 3516. Interlake Ave. and Ashworth Ave., each from North 40th St. to the south line of Koch's Addition; and Dorothy Place, from the easterly line of Koch's Addition to Ashworth Ave.; also an easement along the southerly line of Koch's Addition, from Ashworth Ave. to Stone Way; also the alleys in blocks I and 3, Koch's Addition, by grading the same, constructing sewers and watermains and by constructing concrete sidewalks, as authorized by ordinance.

**Wash., Seattle** — Intention of the City Council to order the improvement of 24th Ave. North, from south margin of Helen St. to East Galer St.; East Lee St., from 23rd Ave. North to 24th Ave. North; and Turner Way, from East Ward St. to Helen St.; all in the city of Seattle, by paving the same and including as a part of said work the construction or reconstruction of all sewers, side sewers and watermains.

**Wash., King Co.**—Seattle plans opening, widening, extending and establishing of North 70th St., from Greenwood Ave. to Fremont Ave.; of North 71st St., from Dayton Ave. to Fremont Ave.; and of Dayton Ave., from North 70th St. to North 72d St.; providing for the changing and establishing of the curb grades of said North 70th St., from Greenwood Ave. to Fremont Ave.; or North 71st St., from Dayton Ave. to Fremont Ave.; and of Dayton Ave., from North 70th St. to North 72d St.; and for the changing and establishing of the grades, and for grading and regrading of the above described streets and avenues and approaches.

**Wash., Seattle**—Resolution of impv. University Way, from East 47th St. to East 59th St.; East Columbia St., East Cherry St., Coesan Ave.

**Wash., Seattle**—Intention of Council to order the improvement of Atlantic St., from 23rd Ave. South to 26th Ave. South; Atlantic St. (north side), from 26th Ave. South to 29th Ave. South; Bradner Place, from Irving St. to Atlantic St.; Grand St., from 27th Ave. South to Rainier Ave.; Holgate St. (north side), from 25th Ave. South to 28th Ave. South; Holgate St., Plum St., Hill St., Walker St. and College St., each from 25th Ave. South to Rainier Ave.; Massachusetts St., from 26th Ave. South to Rainier Ave.; State St., from 22d Ave. South to Rainier Ave.; 23d Ave. South, from Atlantic St. to Rainier Ave.; 24th Ave. South, from Atlantic St. to Walker St.; 25th Ave. South, from Atlantic St. to Holgate St.; 25th Ave. South (west side), from Holgate St. to Rainier Ave.; 26th Ave. South, from Day St. to Atlantic St.; 26th Ave. South (west side), from Holgate St. to Atlantic St.; all in the city of Seattle.

**W. Va., Charleston**—Has program to improve in permanent manner sts. and alleys.

**W. Va., Kanawha Co.**—To issue road impv. bonds to value $90,000.

**Wisconsin**—With $18,000,000 available for road construction in Wisconsin through state and federal aid, the $10,000,000 worth of bonds to be issued by the counties, it is estimated that approximately 350 miles of new concrete roads will be laid by the counties this year.

County road building operations will be nearly as extensive in 1922 as they were last year, when $24,000,000 was spent, $6,000,000 of the amount being held over appropriations from other years.

Wood County has placed an order with the state highway commission for 120,000 barrels of cement for concrete work in the county this year. This will be enough for 40 miles of roadway.

## SEWERAGE

**Cal., Modesto** — Plans constructing sewers in Dist. 1, 3,913 lin. ft. 36-in., 1,682 lin. ft. 30-in., 2,576 lin. ft. 24-in. and 2,056 lin. ft. 18-in. rein.-conc. pipe, 834 lin. ft. 12-in., 1,363 lin. ft. 10-in. and 2,931 lin. ft. 8-in. vitr. pipe, 15,286 cu. yds. excav., 43,520 sq. ft. pavement replacement, 1,921 lin. ft. 6-in. sewer to be removed, etc.

**Cal., Sanger**—Election to vote on bonds to construct sanitary and storm sewerage systems, purchase fire apparatus and construct city jail.

**Colo., Denver**—Englewood plans sewer connection with Denver system.

**Colo., Denver**—City Engr. to advertise the New Washington Park Storm Sewer District No. 2.

**Conn., Wethersfield**—Will spend $200,000 on a nine-mile sewer addition. The work has been commenced on the project.

**Fla., Entes**—Sold issue $110,000 sewerage and street extension bonds.

**Fla., Miami Beach**—July 25, to vote on $125,000 bonds constructing sewerage system. C. E. McCaskill, City Clk.

**Fla., Orlando**—City will spend $340,000 for additional sewers.

**Ill., Chicago**—Bids for East Side sewer to be built by the Sanitary District and referred to the chief engineer of the board of tabulation. At meeting of the board two weeks from today the chief engineer will submit his report, at which time final action will be taken on these bids. The bids for the $3,000,000 bond issue for the purpose of carrying on permanent improvements including the construction of the big intercepting sewer on the East Side took a similar course. Work on the sewer is to be speeded up and indications are that before long the actual work will be under way.

**Ill., Chicago**—Proposes to impv. Ogden Ave., open and widen, fill, excavate, pave, curb, lay sewers, light equipment and other requisite work on street.

**Ind., Indianapolis**—Impt. Res. Central Ave. from 52d to center of 56th St., sewer of vit. brick from 12 to 18 ins.

**Ind., Indianapolis**—Local sewer impv. in alley west of School St.

**Md., Williamsport**—Voted $117,930 bonds for sewerage system. Engineer not anounced.

**Mass., Springfield**—Sewers voted: Overflow sewer, Appleton St. to Walnut St. at intersection of these two sts.; Elmwood Ave., between Northampton and Martin sts.; Oscar St., between Peltier and Perry sts.; Concord Ave.; Claremont, between Greenwood Ave. and Hillside Ave.; Madison Ave., between Jefferson and Irving Sts.; Sycamore St., between Hampshire and Cabot sts.; Cabot St., west to Sycamore St., to accommodate property east of the cemetery. Voted to construct a 36-inch culvert in the Elmwood dingle, north of Carlton St.

**Mass., Boston**—The Mayor approved orders for new construction work: a sanitary sewer of conc. 1-ft. 6 ins. by 2-ft., and 1-ft. 6-in. by 1-ft. 8-in. spurs at intersecting streets, and seven catch-basins in Claflin St., between C and D Sts., and a santary sewer of conc. 2 ft. 8 ins. by 4 ft. n D St., between the centre lne of Claflin St. and the southwesterly line of Claflin St., in the South Boston district, at an estimated cost of $1,908. A surface drain of 3 ft. circular conc. in Everett St., between Western Ave. and Adams St., in the Brighton district, estimated cost of $19.500. A 4-ft. 3-in., 3-ft. 6-in. and 3-ft. conc. overflow, two catch-basins and minor drain in Maverick St. between a point 540 ft. southeast of Jeffries St. and Lamson St., in the East Boston district, at an estimated cost of $35,000. A conc. sanitary sewer 1 ft. 6 ins. by 2 ft. and 1 ft. 6 ins. by 1 ft. 8 ins., spurs at intersecting streets, and seven catch-basins in Claflin St., between C and D Sts., and a sanitary sewer of conc. 2 ft. 8 ins. by 4 ft. in D St., between the centre line of Claflin St. and the southwesterly line of Claflin St., in the South Boston district, at an estimated cost of $1,908. A surface drain of 3-ft. conc. in Everett St., between Western Ave. and Adams St., in the Brighton district, at an estimated cost of $19,500. An overflow of 4 ft. 3 ins., 3 ft. 8 ins. and 3-ft. conc., .two catch-basins, and minor drain in Maverick St., between southeasterly line of Jeffries St. and Lamson St., in the East Boston district, at an estimated cost of $24,000.

**Mich., Detroit**—Had plans prepared 5,358 ft. sewer in Clark and Lovett Aves. from Michigan to Herbert Aves., 11 ft. 6 in. to 11 ft. 3 in. diam., 4,302 ft. Harper Ave. Arm, Sect. 1 of Connors Creek Sewer in Harper and Annsburg Aves. from Connors to Wade Aves., 6 ft. 3 in. to 6 ft. 6 in. diam., 2,813 ft. Harper Ave. Extension of Ashland Ave. Sewer, in Harper and Nelson Aves., from Newport to Wade Aves., 3 ft. 3 in. to 4 ft. 3 in. diam, 3,576 ft. Piquette Ave. Arm of Bates St. Sewer, in Piquette Ave. from John R. to Russell Sts., 3 ft. to 5 ft. 6 in. diam. J. W. Reid, City Engr.

**Mass., Boston**—To const. sewerage works in Salt Creek Brook, conduits Moverielo St. from 500 ft. S. E. Jeffries to Lamson St., E. Boston, Lorna Rd. between Morton St. and Tiverton Rd., Oak Ave., Dorchester.

**Minn., St. Paul**—City to build sewer on Cecilia Pl., from Sinclair N. to Stanford Ave.

**Minn., St. Paul**—To construct sewer on St. Anthony Ave., from Oxford to Dunlap St., Hawthorne St., from Cypress to Forest St., Shadow Falls Park from Oretim Ave. S., to Lot 10.

**Minn., Brainerd**—Plans trunk sewer, $35,000. R. T. Campbell, City Engr.

**Minn., Waseca**—The City Council considering specifications for three new methods of sewage disposal for the city. All plans provide for the carrying of sewage to the Le Sueur River at points to the southwest or west of Waseca. The three routes call for expenditures of $75,000, $75,900 and $82,000.

**Neb., Grand Island**—The citizens of Grand Island, Neb., voted in favor of a bond issue of $200,000 for sanitary sewerage extension and $100,000 for storm sewerage extension.

**N. J., Newark**—Beaumont Pl. sewer, Grafton Ave. and Third St. sewer and Victoria St. sewer.

**N. Y., Rochester**—Chatham St. sewer and asphalt pavement. Chatham St. sewer and pavement resurfacing.

**N. Y., Boro. Bronx**—Construction of temporary sewers and appurtenances (for house sewage only) in Barnes Ave. between Digney Ave. and E. 234th St.

**N. Y., Boro. Bronx**—Construction of sewer and appurtenances in Taylor Ave. between Seward Ave. and Sound View Ave.; across Sound View Ave. at Taylor Ave., and in the west side of Sound View Ave. between the change of grade just north of Taylor Ave. and Randall Ave.; in the east side of Sound View Ave., between Taylor Ave. and Randall Ave.

**N. Y., Boro. Bronx**—Permanent sewers and appurtenances in Melville St. between Morris Park Ave. and Van Nest Ave.; and in Van Nest Ave. between Van Buren St. and Unionport Rd., together with all work incidental thereto.

**N. Y., Boro. Bronx**—Sewers and appurtenances in Lacombe Ave. between White Plains Rd. and Sound View Ave., and in Underhill Ave. between Lacombe Ave. and Sound View Ave., together with all work incidental thereto.

**N. Y., Boro. Bronx**—Construction of sewer and appurtenances in Underhill Ave. between Randall Ave. and Lacombe Ave.

**N. Y., Boro. Bronx**—Construction of sewer in Mulford Ave. between Morris Park Ave. and Buhre Ave.

**N. Y., North Tonawanda**—Plans to extend sewerage system, $25,000. C. T. Oelkers, City Hall, Engr.

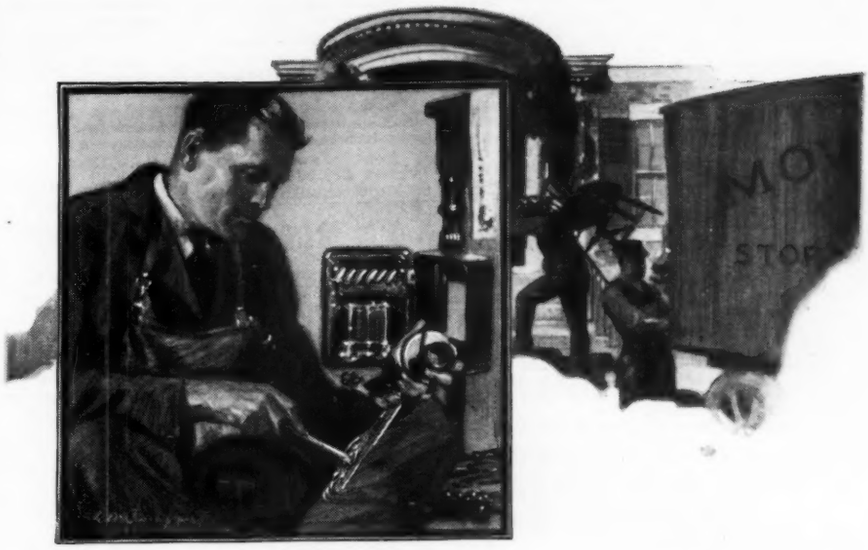
**N. Y., Boro. Brooklyn**—Local board of the Flatbush Dist. to construct a sewer in East 48th St., from Snyder Ave. to a point about 380 feet south of Snyder Ave.

**N. Y., Boro. Brooklyn**—To construct sewer, Fort Hamilton Parkway (westerly side), from 70th St. to 71st St., Boro. of Brooklyn.

**N. Y., Boro. Brooklyn**—Resolution to construct sewer in East 48th St., from Snyder Ave. to a point about 380 feet southerly therefrom.

**N. Y., Boro. Brooklyn**—To build sewer, East 31st St., from Ave. M to Ave. N, Boro. of Brooklyn; Bay Ridge Ave. (69th St.), from 19th Ave. to 20th Ave., Boro. of Brooklyn.

**N. Y., Boro. Brooklyn**—To construct sewer, Ridge Blvd., from 92d St. to 94th St., Boro. of Brooklyn—sewer (Cal. No. 65).

# 1,820,000 Telephones Moved

In the telephone business every day is "moving day." Telephone subscribers are probably the most stable and permanent portion of our population; yet during the past year one telephone out of every seven in the Bell System was moved from one place of residence or business to another at some time during the year.

The amount of material and labor, and the extent of plant changes involved in "station movement" are indicated by the fact that this item of service cost the Bell System more than $15,000,000 in 1921.

To most people, the connecting or disconnecting of a telephone seems a simple operation of installing or removing the instrument. As a matter of fact, in every case it necessitates changes in the cables and wires overhead or underground. It also necessitates changes in central office wires and switchboard connections; in subscribers' accounts and directory listings; and frequently requires new "drop" lines from open wires or cables.

The problems of station movement are among the large problems of the telephone service. Because of the double operation of disconnecting and re-connecting, the work involved is often twice as great as in the case of new subscribers. With nearly 2,000,000 changes a year, it is only by the most expert management of plant facilities that Bell service is enabled to follow the subscriber wherever he goes.

"BELL SYSTEM"

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

*One Policy, One System, Universal Service, and all directed toward Better Service*


**N. Y., Boro. Richmond**—Sewer to be built in Winant St., from Richmond Terrace to a point about 35 feet north of La Salle St., Boro. of Richmond.

**Ohio, Ashtabula**—City Manager W. M. Cotton has recommended to the council the employment of George B. Gascoigne, Cleveland, in connection with preliminary surveys looking toward the erection of a $1,000,000 sewage disposal and garbage collecting system in Ashtabula.

**Ohio, New Philadelphia**—Service Director Fred R. Kislig is to advertise for bids for storm sewers. Estimated, $188,200.

**Ohio, Van Wert**—To issue $392,000 bonds to build a sewage disposal system.

**Ohio, Struthers**—Parts of ten streets are to be sewered.

**Ohio, Hamilton**—Will advertise for the construction of storm sewers and house connections in several streets in Lindenwald, the estimated cost being $17,945.

**Ohio, Steubenville**—An ordinance for a $30,000 emergency bond issue for rebuilding and repair of Stony Hollow sewer and the construction of branch sewers.

**Ohio, West Park**—Authorized const. of a sewer in West 152d St.

**O., Cleveland**—To construct a sewer and its appurtenances in Bosworth Rd. S. W., between Bellaire Rd. S. W. and Dixon Rd. S. W.

**O., Cuyahoga Heights**—An emergency ordinance directing the director of public service to enter into an agreement with the village of Cuyahoga Heights for a temporary sewerage treatment plant.

**O., Cleveland**—An emergency ordinance to expend a sum not to exceed $1,800 for the construction of a sewer in Dodge Ct. N. E.

**O., Toledo**—A big sewer project will connect Maumee with the Toledo intercepting sewer system now under construction is being worked out by Lynn C. Boyatt.

**O., Hamilton**—Sannitary sewers and house connections costing $17,945 will be installed in streets in Lindenwald not having such improvements. F. E. Weaver, the City Engr., has been authorized by the Council to prepare plans for these improvements immediately.

**O., Cleveland**—Council adopted a resolution declaring the necessity to construct part 8 of the water supply system for county sewer districts 1 and 2.

**O., Greenville**—Council will issue $2,500 in bonds for city's portion of construction lateral No. 3, in storm water sewer district No. 1.

**O., Sharon**—Contract for seven miles of sewer to be constructed on the west hill in Sharon, O., has been let by County Commissioners of Trumbull Co. The contract amounts to $80,969.75.

**O., Lima**—Work has been started on the new $560,000 intercepting sewer system of Lima, O.

**O., Akron**—Voted $3,000,000 bond issue for sewer construction.

**O., Cleveland**—Ord. to contr. sewer in Botany Ave. S. W. between W. 14th St. and 128 ft. E. line W. 15th St.

**O., Cleveland**—To construct a sewer and house drains in Marcella Rd. N. E. from E. 185th St. to Lake Shore Blvd.

**O., Akron**—Issue and sell bonds of the City of Akron in the sum of $3,000,000 for the construction of trunk sewers on North Hill, East Akron, South Akron and West Hill or any district in the City of Akron not adequately provided.

**O., Cleveland**—To proceed with the construction of a sewer in W. 28th St. between Washington Ave. N. W. and River Rd. N. W.

**O., Akron**—Ordinance to improve Charlotte St. from Aqueduct St. to Weber Ave., by a sewer with laterals for house conections, and water service connections.

**O., Cincinnati**—Ordinance providing for issue of bonds of $60,900 for providing funds to pay the cost of acquiring real estate and easements of an irregular tract of land extending from the intersection of Ravine St. and Fairview Ave. to McMicken Ave. opposite Rush St. for the opening and constructing a public street between the above mentioned points.

**Pa., Hazleton** — Bonds have been opened in Hazleton, Pa., for the construction of six new sewers for the city.

**Tex., Stamford**—An issue of 5% (serial) sewer bonds to the amount of $29,500.

**West Virginia**—Plans a new sewer in Market St.

## LIGHTING AND POWER

**Cal., San Francisco**—Res. adopted taking over the lighting of the "Path of Gold" and "Triangle" at an estimated cost of $36,000 a year.

**Colo., Denver**—Ordinance to place 33 ornamental lights on Sante Fe Drive.

**Ill., Chicago**—The City Council approved expenditure of $5,200,000 for bridges, viaducts and electric light system extensions.

**Ind., Knightstown**—For sale $9,000 municipal bonds, 5%, 3½ years. For improving the municipal electric light plant of said town; as on specifications. R. M. Parker, Town Clk.

**Ia., Waterloo** — Municipal electric light plant contemp. A. E. Gnagy, City Clk.

**Mich., Kalamazoo**—Will vote in November on $3,348,658 municipal gas plant bonds.

**Minn., Winton—Power Plant** — Will bld. on Kawishiwi river. Minnesota Utilities Co. Hydro elec. $1,750,000.

**Minn., New Ulm—Power Line**—Will construct this summer, from Lafayette to Bernadotte store, 8½ mi.

**Mo., Hale**—Voted in favor of $7,000 municipal light plant engine bonds.

**Mo., Columbia**—Will vote on $100,000 gas works improvement bonds.

**Neb., Pickrell**—A recent election resulted by a vote of 58 to 10 in favor of issuing lighting system bonds to the amount of $12,000.

**Neb., Kenard**—Will vote July 17 on $5,500 electric lighting system and paving bonds.

**Neb., Avoca, Cass Co.**—Recently voted $15,000 electric light and $8,500 transmission line 6% 10-20 year. op. bonds.

**Ohio, Akron**—The Koegel Constr. Co. Central Savings & Loan Bldg., has the general, E. Rohny, Steubenville, the heating, and McClay & Porter, Steubenville, the wiring contracts for the fire station for the village of Dillonvale, O.

**Ohio, Ashtabula**—Proposition to the city for the erection of a holder with a capacity of 500,000 cu. ft., and a blue water gas generator with a capacity of 500,000 cu. ft. every 24 hours. He estimates the expense of this at $150,000.

**O., Cleveland**—To install electric lights on Clarke St., W. 16th St., Buckeye Rd., E. 144th St., Miles Ave., E. 128th St. and Trent Ave.

**Ohio, Warren**—E. L. Franklin, vice-president and manager of the Warren division of the Ohio Public Service Co., announces that his company will spend $4,000,000 for power expansion, of which one-fourth will be spent in and around Warren. Orders are now being placed for material and equipment, and surveyors are working in the field. A ten years lighting contract will be made with this company by the Warren city council.

**O., Toledo**—To improve by lighting with electric lights, Baxter St. and Bishop St. and Trenton Ave.; Buckingham St. and Miller St., Collins St. and Detroit Ave.; Dorr St. and Wheeler St.; Lindsay Ave. and Pierce St.; Nebraska Ave. W. of M. C. R. R.; Ogden Ave. and Spencer St.

**O., Toledo**—To improve, by lighting with electric lights, Berdan Ave. and Haverhill Drive; Burnham Ave. and Dryden Drive; Central Ave. and Wilcox St.; Haverhill Drive between Berdan Ave. and Phillips Ave.; Hazelhurst Ave. and Sylvania Ave.; Hoiles Ave., two lamps. bet. Sylvania Ave. and Berdan Ave.; Wilcox St. bet. Central Ave. and Ketcham Ave. Monroe St. bet. Auburn Ave. and Albion St. (Three lamps to be removed and eight new lamps staggered equidistant bet. Auburn Ave. and Albion St., lamps to be mounted upon Bates one piece steel poles and all wires carried in the rear of property on Monroe St.) Central Ave. and Maher St.; Elm St. and Manhattan Blvd.; Glendale Ave. and Vassar Drive; Lagrange St. and Windemere Blvd.; Ontario St. bet. Ash St. and Buffalo St.; Second St. bet. Oak St. and Utah St.

**O., Zanesville**—Buffington, of Columbus, has been granted a franchise by the Village Council of Philo, O., to furnish power to that place. He will erect a power house at Philo or at Merriam Station.

**Pa., Harrisburg**—The bond of the Harrisburg Light & Power Co. of $90,000, given as surety on its five-year street lighting contract with the city, was approved by Council.

**Va., Richmond**—Gas mains to be laid include mains from Moody Ave. from 32d to 33d; alley between Belmont and Cleveland, Kensington and Patterson; alley between Second Ave., Meadow to Second and Spruce; Meadowbrook Rd., from Spruce St. south; alley west of Garland to alley east of North Ave.; Garland Ave. north of Ladies Mile Rd.; North Ave. north of Ladies Mile Rd.; Taylor, between Mulberry and Robinson; Brook Rd., from Brook Pike to Laburnum; Lower Gas Works to West End holder.

**Wis., Oshkosh—Dam, Power House**—Application made to federal power com. for permit in Menominee river in Marinette and Menominee Cos. White Rapids Paper Co.

**Wis., Milwaukee—Power, Light and Htg. Plant**—Plans in prog. for plant at Wauwatosa. Milwaukee Co. Bd. of Administration, W. F. Coffey, Milwaukee. $500,000.

**Wis., Merrill—Dam**—Voted to constr. on Spirit river. Wausau Valley Improvement Co., W. E. Brown, Rhinelander, Pres. Gravel and dirt embankments protected by sheet piling, concr. gate wks. $75,000.

## WATER SUPPLY

**Cal., Lakeport**—Plans prepared for waterworks system, including c. i. pipes, auxiliary pumping plant, semi-diesel pumping engine, etc., $65,000; 3 small septic tanks, incl. automatic pump and sewer laterals, $32,000.

**Calif., East San Diego**—An election will be held on July 20 to vote an issue of municipal water system bonds to the amount of $260,000.

**Cleveland**—The council has received an ordinance for a $2,062,000 bond issue for the erection of a pumping station power houses and laying of mains for the Baldwin reservoir project. The measure has been referred to council committees.

**D. C., Washington**—A water supply program involving $8,738,000 plans for the construction of a n 8-mi. conduit, a new filtration plant, a pumping station and 2 new distribution reservoirs. Contractors may bid on all three or any one section of the conduit.

**Fla., Orlando** — Water works and electric light bonds, $975,000.

**Fla., Orlando**—$975,000 worth of water and light bonds sold.

**Idaho, Boise**—The reclamation bond commission has issued an order recommending the certification of $500,000 worth of irrigation bonds of the Crane creek and Sunnyside irrigation district in Washington county. The Crane district will issue $165,000 worth and the Sunnyside district $333,500.

The Crane creek district comprises 3,591 acres of irrigated land.

The Sunnyside district includes 6,514 acres of land, and the reported value is $873,437.

**Ind., Jasper Co.**—Sale $5,500 water works bonds, 5%, 10 years.

**Ind., Cambridge City**—For sale $4,500 improvement bonds, 5%, 5 years. For the installation of an additional municipal well in said town, as on specifications. Clifford Jacobs, Town Clk.

**Ia., Storin Lake**—Citizens decided for bond issue of $40,000 for water works and impvt.

**La., Calcasieu Parish** (P. O. Lake Charles)—The election held June 12 to vote $2,750,000 bonds to dig a deep-water canal, carried.

**Md., Princess Ann**—Issue of $40,000 in bonds for complete water and sewer system for towns.

**Md., Williamsport**—Bond issue of $100,000 carried to install modern water supply system.

**Md., Williamsport** — Voted $100,000 bonds for water system. Engineer not announced.

**Mass., Andover**—An issue of water bonds to the amount of $40,000.

**Mich., North Branch**—A recent election resulted in favor of issuing water system construction bonds to the amount of $40,000.

**Mont., Hysham**—An issue of water, sewer and funding bonds to the amount of $25,000.

**Mont., Great Falls**—Will vote on $60,000 municipal water plant bonds.

**Mont., Harlem**—Soon takes bids filtration plant and 8,000 ft. 6 in. c. i. mains, $45,000.

**Mo., St. Louis**—Officials of the water department of St. Louis are contemplating the construction of additional water works to supplement the present supply.

**Neb., Lincoln**—An election will be held on July 11 to vote an issue of 5% water works improvement and storm sewer extension bonds of $35,000.

**Neb., Adams**—The $25,000 to $30,000 water system bonds will soon be voted on.

**Neb., Adams**—Citizens in favor of a water system to cost $25,000.

**N. Y., Garden City**—May purchase a water plant and will market $1,000,000 bonds if the transaction goes through.

**N. Y., North Tonawanda**—The sealed bids until July 10, for water, sewer and filtration plant bonds to the amount of $345,000.

**N. Y., Fire Island (Saltaire)**—Town voted $36,000 in bonds for a water system.

**N. C., Rocky Mount**—Water supply, sewerage and paving coupon bonds to the amount of $275,000.

**N. C., Kernersville**—J. & J., 26-year (average) water and sewer bonds to the amount of $105,000 sold.

# WATER WORKS EQUIPMENT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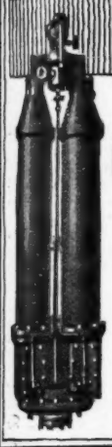

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**O., Cleveland**—To construct a water main with the appurtenances in Ralph Ave. S. W., from W. 32d St. to W. 35th St.

**O., Cleveland**—Ordinance to expend a sum not to exceed $15,000 for lead pipe and laying water mains, for the division of water.

**O., Cleveland**—Ordinance to expend a sum not to exceed $10,000 for three, two ton auto trucks, for the division of water, department of public utilities.

**O., Toledo**—Bonds of $275,000 value to pay cost of new water works.

**O., Sandusky**—The Co. Comrs. prepared final step in furnishing water to Rye Beach by resolution for acquiring land for laying mains.

**O., Barbeton**—State authorities to purchase of water by this city from the municipality of Kenmore, O.

**O., Dayton**—Three mi. of water main to be laid to supply water to east end district.

**O., Middletown**—Is determined to proceed with the improvement of Meadow Ave., from Yankee Rd. to Torrence St., by laying and constructing 6-in. water pipe in accordance with the plans, specifications, etc.

**O., Cleveland**—To constr. water mains south side S. View Ave. from St. Clair to Syracuse Ave.

**O., Cleveland**—An ordinance to appropriate property for the supply of water for the City of Cleveland by furnishing sites for reservoir, pumps and other waterworks.

**O., Cleveland**—To build water main in Walbrook Ave. S. W. to W. 35th St.

**Okla., McAlester**—Bd. Comrs. retained Benham Eng. Co., Engrs., Gumbel Bldg., Kansas City, Mo., to prepare plans for Bull Creek water project, incl. dam. E. M. Fry, City Mgr.

**O., Wellsville** — Plans by Morris Knowles, Inc., Cleveland and Pittsburgh, call for $400,000 expenditure. Gravity system recommended as cheapest.

**Tex., Dublin**—Voted $25,000 bonds for waterworks. J. S. Daley, Mayor.

**Tex., Moran**—Voted $35,000 bonds for waterworks improvements. Address Mayor. S. & R.

**Tex., Lancaster**—Water and sewer improvement bonds to the amount of $15,000.

**Tex., McLean**—July 18, to vote on $74,000 bonds for waterworks improvements, light and power plant and street improvements. Address Mayor.

**Tex., Clarksville**—Voted $22,000 bond issue for waterworks improvements, $20,000 for additional street paving and $3,000 for incinerator plant. P. Y. Creager, City Engr.

**Tex., Anson**—Voted $80,000 to install and complete waterworks system. Address Mayor.

**Utah, Ogden**—W. S. Crane, City Engr., soon takes bids installing 12, 18 and 20 in. Matheson joint or c. i. mains, $166,000.

**Va., Richmond**—Water mains to be laid include mains from 33d St. from Forest Hill to Woody Ave., from same to 33d St., 32d from Moody to Midlothian Pike; alley between Second Ave. and Meadowbrook Rd. to Second Ave. and Spruce St.; 40th St. to Peyton to McRea; Decatur, from 32d to Broad Rock Rd.; Lawson, from 38th St. to 39th St.; Bainbridge, from Toler to 30th; 29th, south of Bainbridge, and from 29th from Bainbridge to Semmes; Carlisle, from Salem to Government Rd.; William St., west of Oak; 21st St., from Edwards to Petersburg Pike; Taylor between Mulberry and Robinson; Mulberry and Beverley to Sixth and Canal Sts.; Sixth and Canal Sts. to Sixth and Main; 25th, from P to Nine-Mile Rd.; Broad, from Roseneath Rd. to Sauer Ave.; Sauer Ave., from Broad to Monument; Monument Ave., from Sauer to Antrim.

**Wash., Seattle**—Plan for laying water pipe and maintaining water system in Kings. Co. Wash. Dist of E. Seattle.

**Wis., Iron Ridge**—Will vote $25,000 water works and $10,000 sewer bonds.

**Wis., Platteville**—Having plans prepared furnishing and laying 1.5 mi. 6-8-in. vitr. sewers, $25,000.

## FIRE

**Fla., West Palm Beach**—Issue of fire protection system, water front improvement and building bonds to the amount of $125,000.

**Md., Funktown**—Vol. Fire Ass. to buy new fire truck.

**Mass., Bedford**—Motor fire truck not yet bought; $10,000 to $12,000 available for new apparatus.

**Mass., W. Medway**—To spend $4,000 for motor fire truck Station No. 1.

**Mo., St. Joe**—Citizens voted bond issue of $240,000 for fire equipment.

**Mo., Maplewood**—The fire department of Maplewood, Mo., is to have a new Seagrave 750-gal. triple combination pumper.

**N. Y., Boro. Queens**—Acquiring new sites, 1st St. and Elsie Place, Bayside; Creed Ave., near Carey; Union Ave., near Carey, for fire houses.

**N. Y., Middleton**—The city of Middleton, N. Y., has purchased for its fire department a Stutz 750-gal. triple combination pumper.

**O., Portsmouth**—The Council of the Village of Jackson has authorized the Mayor to borrow $1,500, the proceeds from which are to be applied to the purchase of a fire truck.

**O., Bellefontaine** — The village of Huntsville near here has sustained fire which entails a loss of $11,000. The town is without protection.

**N. Y., Elmira**—Impvts. in fire protection planned.

**N. Y., Niagara Falls**—City Manager Edwin J. Fort says the city needs a new 75-ft. aerial ladder for which there is an appropriation in the budget. A $13,000 triple pumping engine, hose cart and chemical wagon has just been purchased from the American-La France Co. and has arrived.

**N. Y., La Salle**—Bond issue of $5,000 planned to purchase fire truck and hose.


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Highway No. 8018-A.—Bradford-Carrollton, Part 2 (Carrollton Bridge). The work to be done under this contract includes seven spans of steel trusses weighing approximately 1,150,000 lbs. with six concrete piers and two abutments. The approximate length of steel structure is 895 feet, and the roadway is 20 feet in width, surfaced with wood block on a reinforced concrete floor.

ALSO FOR THE IMPROVEMENT OF THE FOLLOWING HIGHWAYS:

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Steuben .....(one highway: 1.01)
Wayne .....(one highway: 1.65)

Maps, plans, specifications and estimates may be seen and proposal forms obtained at the office of the Commission in Albany, N. Y., and also at the office of the division engineers in whose division the roads are to be improved. The addresses of the division engineers and the counties in which they are in charge will be furnished upon request.

Thre especial attention of bidders is called to "General Information for Bidders" in the itemized proposal, specifications and contract agreement.

HERBERT S. SISSON, Commissioner.
J. C. FINCH, Secretary. (2-3)

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TREASURY DEPARTMENT, Supervising Architect's Office, Washington, D. C., June 28, 1922.—SEALED PROPOSALS will be opened in this office at 3 p. m., July 24, 1922, for New Sanitary Sewer, etc., at the United States Post Office and Custom House at Eagle Pass, Texas, in accordance with specification and drawing, copies of which may be had at this office or at the office of the Custodian, Eagle Pass, Texas, in the discretion of the Supervising Architect. Jas. A. Wetmore, Acting Supervising Architect. (2-3)

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**O., Kent**—An ordinance has been passed authorizing $60,000 5½% (M-S) fire department bonds.

**O., Eaton**—The Eaton Chamber of Commerce is discussing the question of a better fire alarm system for this city. At present the only way of sending in an alarm is by telephone after which the fireman on duty at the station rings the fire bell and starts his auto truck. The chamber advocates the installation of an automatic system in connection with the use of the telephone or by a fire box system.

**Pa., Ardmore**—$18,000 to be raised to purchase new fire apparatus for district.

**Pa., Wilson**—Bond issue $107,000 for impvt. to include new fire apparatus.

## BRIDGES

**Ala., Palos**—Jefferson Co. (Birmingham) having surveys made and takes bids in about 90 days, bridge near here, probably steel spans on concrete abutments and piers, $60,000.

**Arkansas, Texarkana** — Government approves plans for the Pettis Ferry bridge, first of the three structures to be erected over Sulphur river under the recently authorized $65,000 bond issue in Bowie County.

**Cal., San Francisco**—Hearing before a board of army engineers in San Francisco a proposal made to cross the bay at Carquinez Straits with a 3,000-ft. suspension bridge with a 1,500-ft. central span.

**Cal., San Francisco**—San Francisco Transit Co. plans 3,000 ft. suspension bridge, with 1,500 ft. central span, over Carquinez Straits.

**Cleveland**—An ordinance authorizing the beginning of work on grade crossing elimination on the Pennsylvania rd., between Cedar and Holton aves., passed. Total cost, $3,360,000.

**Colo., Denver**—Plans new concrete bridge at 13th St. and Federal.

**Del., Dover**—Bids by State Hgwy. Dept., care I. Paul Jones, Dover, to July 26 for bridges.

**Neb., Oreapolis**—Chicago, Burlington & Quincy R. R., 547 West Jackson Blvd., Chicago, soon takes bids for steel and concrete bridge to replace present bridge over Platte River, near here. $400,000.

**N. H., Conway**—Town Council, North Conway, contemplate bridge in Conway.

**N. Y., Niagara Falls**—Drawing plans for side ext. to bridge in Niagara Falls for Niagara Falls International Bridge Co., of N. Y. & Niagara Falls Suspension Bridge Co., of Canada, Niagara Falls. C. E. Fowler, Engr.

**N. Y., Warsaw**—Plans drawn for bridge to cost $100,000 in Warsaw for Buffalo-Rochester & Pittsburgh R. R., 155 W. Main St., Rochester.

**N. C., Mocksville**—Davie Co. receives bids latter part of July constructing 125 ft. steel truss over Hunting Creek, 16 ft. roadway. N. S. Mullican, Winston-Salem, Engr.

**North Carolina**—State Hgwy. Dept., Raleigh, plans steel and rein.-conc. bridges between Clinton and Warsaw, Project 274, Sampson and Duplin Cos., $50,000; rein.-conc. or structural steel bridge over New River, near Jacksonville, Project 366, Onslow Co., $40,000; rein.-conc. or structural steel bridge over Roanoke River, at Roanoke Rapids, Project 169, Northampton and Halifax Cos., $10,000.

**Ohio, Hamilton**—City Engineer will prepare plans and specifications for the proposed stationary concrete bridges over canal at Maple, Hensley, Lincoln and Dayton Sts. Service Director Mason has awarded a contract to John Conrad to protect the Shuler and Harmon Ave. bridges over Crawford's run, after which the city will strengthen the banks at these places.

**Ohio, Hamilton**—Estimates of cost made for the replacement of all city bridges over the Miami and Erie Canal by concrete stationary bridges.

**Ohio, Girard**—Plans for proposed high level bridge have been submitted by county officials in a meeting in the council chamber here. Steel and concrete, $729,000.

**Ohio, Youngstown**—Expenditure of $40,000 for repairs on the Elm St. bridge has been authorized.

**Ohio, Troy**—Plans for the construction of a new bridge at Ash St. in East Piqua, which leads to the Urbana pike submitted to the engineers of the conservancy district for approval of a waterway, and as soon as this approval is received complete plans and specifications will be prepared so that the work can be submitted to bidders.

**O., Mt. Gilead**—Bids by Bo. of Co. Comrs., M. A. Goff, Clk., Court House, Mt. Gilead, to July 14 for bridge in Morrow Co.

**O., Columbus**—Bids by State Hgwy. Comr., L. C. Herrick, Hartman Hotel Bldg., Columbus, to July 14 for bridge in Preble Co. C. A. Burns, Engr., Court House, Eaton, O.

**O., Steubenville**—S. M. Floyd, Court House, Steubenville, to July 14 for bridge in Jefferson Co.

**Okla., Hugo**—Bridges over Boggy and Kiamichi Rivers, east and west of Hugo, respectively, are to be refloored and given a general overhauling.

**Pa., Reading**—Drawing plans for widening highway bridge in Berks Co.

**Pa., Josephine**—Drawing plans for bridge to cost about $75,000 for Buffalo-Rochester & Pittsburgh R. R., 155 W. Main St., Rochester, N. Y.

**Tenn., Nashville**—Bids by City Council, Felix Wilson, City Hall, for 2 viaducts to cost $350,000.

**Tenn., Nashville** — Voted $375,000 bonds, this with $250,000 previously voted will be used for 2 rein.-conc. viaducts, one on Church St., other on Meridan St. Freeland, Roberts & Acker, Independent Life Bldg., Engrs.

**Tex., Bowie**—$65,000 bond issue to be used as the county's part of the cost of building three permanent bridges across the Sulphur River.

# EQUIPMENT BARGAINS

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**Tex., Brenham**—Washington Co. making plans 3,500 ft. bridge over Brazor River between Waller and Washington Cos., 700 ft. steel truss, 2,-800 ft. earth approach and fill. $200,000.

**Washington, Aberdeen**—Plans drawn by the Strauss Bascular Bridge Co. of Chicago for a Bascular steel bridge over the Wishkah river at Wishkah St. The cost from $100,000 to $140,000. The plan presented by Mr. Isaacson is that $50,000 be subscribed by individuals, $15,000 be appropriated by the city, and the balance to be raised by a small toll charge.

## MISCELLANEOUS

**Del., Wilmington**—An appropriation of $125,000 approved for Wilmington Harbor, Absecon Creek, Atlantic City, $50,000; Cool Spring Inlet, Cape May, $50,000; Smyrna River, Delaware, improvements to jetties, $30,000, and an appropriation of $30,000 for the cutoff of the Jones River, Delaware, leading to Dover.

**D. C., Wash**—July 17, by Dist. Comrs., 509 Dist. Bldg., additional incinerators to Trash Plant, Mt. Olivet Rd. and Montello Ave.

**Fla., Orlando**—To build a $25,000 incinerator in the city.

**Fla., St. Petersburg**—Soon takes bids constructing incinerator. $15,000 bonds voted. G. B. Shepard, Dir. Pub. Wks.

**N. Y., Buffalo**—City of Buffalo plans to spend $2,140,000 on big improvements on its waterfront and harbor.

**Ohio, Dayton**—The Miami Conservancy is about to build a small dam at the mouth of Wolf creek, which will cost approximately $5,000, and will be constructed by Price Bros., of this city, contractors.

**Ohio, Cleveland**—A $2,000,000 bond issue for the building of a new garbage disposal plant. The present plant at Newburg Heights is antiquated and unable to take care of the garbage, and the odors make conditions almost unendurable to thousands of Fifteenth ward residents.

**Ohio, Portsmouth**—Garbage incineration plant contemplated. Chas. Walther, of Clarksburg, W. Va., builder of such plants, has addressed public meetings. Dr. O. D. Tatje, Health Commissioner.

**O., Cleveland**—An emergency ordinance authorized the director of public service to construct the appurtenances to and install new equipment at the garbage reduction plant.

**O., East Cleveland** (Cleveland P. O.) —Aug. 8 to vote on $150,000 bonds for 1-story garage incinerator, brick, steel and conc. C. M. Osborn, City Mgr. Architect not selected.

**Pa., Philadelphia**—Allotments of $3,-126,000 have been made by the War Dept., Engrs. Office, for the improvement of the Delaware River.

**Pa., Bradford**—An issue of incinerating plant bonds to the amount of $25,000.

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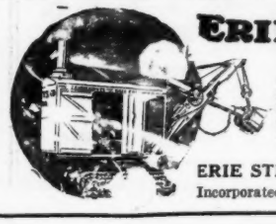

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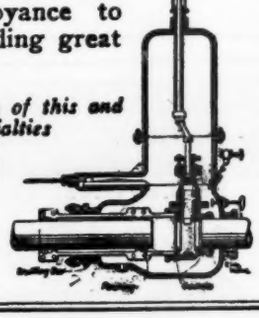

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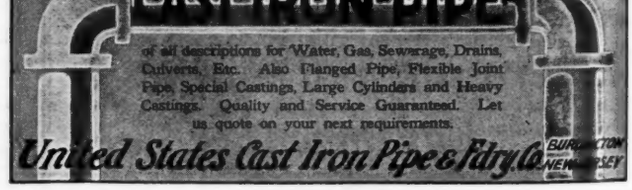
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| Goodyear Tire & Rubber Co. | — |
| Green, L. P., Co. | — |
| **H** | |
| Hansen, A. E. | 24 |
| Hazen, Whipple & Fuller | 24 |
| Headley Good Roads Co. | 4 |
| Heil Company | — |
| Heltzel Steel Form & Iron Co. | 30 |
| Hetherington & Berner | 5 |
| Hersey Mfg. Co. | 8 |
| Hill & Ferguson | 24 |
| Holt Mfg. Co., Inc. | — |
| Honhorst Co., The Jos. | — |
| **I** | |
| Independent Concrete Pipe Co. | 3 |
| Ingersoll-Rand Co. | — |
| Ingram-Richardson Mfg. Co. | 2 |
| **J** | |
| Jaeger Machine Co. | 2 |
| **K** | Page |
| Kinney Mfg. Co. | 6 |
| Koehring Company | — |
| Koppel Industrial Car & Equipment Co. | — |
| **L** | |
| Loper Fire Alarm Co. | — |
| **M** | |
| Maclachlan Reduction Process Co., Inc. | 24 |
| Marine Metal & Supply Co. | 23 |
| Mueller Mfg. Co. | — |
| **N** | |
| Nat'l Cast Iron Pipe Co. | 21 |
| Nat'l Moulding Press Corp. | — |
| Nat'l Water Main Cleaning Co. | 26 |
| Newport Culvert Co. | — |
| New York Continental Jewel Filtration Co. | 21 |
| Norwood Engineering Co. | 26 |
| **O** | |
| Ohio Municipal Equipment Co. | 6 |
| Ohio Vitrified Pipe Co. | 25 |
| Orton & Steinbrenner Co. | 4 |
| **P** | |
| Pacific Flush-Tank Co. | 25 |
| Pawling & Harnischfeger Co. | — |
| Penn. Salt Mfg. Co. | — |
| Pittsburgh Meter Co. | 8 |
| Pollock, Clarence D. | 24 |
| Potter, Alexander | 24 |
| **R** | |
| Ransome Concrete Mach. Co. | — |
| Republic Iron Works | 5 |
| Robinson Clay Product Co. | 21 |
| Ruberoid Co. | — |
| Russell Grader Mfg. Co. | 7 |
| **S** | |
| Sanitation Corporation | 25 |
| Schramm, Inc. | — |
| Skinner, Frank W. | 24 |
| Smith, A. P., Mfg. Co., The | 26 |
| South Bend Foundry Co. | — |
| Stacy-Bates Co. | 26 |
| Standard Oil of Indiana | — |
| Standard Oil Co. (N. Y.) | 6 |
| Sterling Eng. Co. | 29 |
| Stewart, W. H. | 26 |
| Stumpf Una-Flow Engine Co. | — |
| Sullivan Mach. Co. | — |
| Sweet's Steel Co. | 5 |
| **T** | |
| Texas Co. | — |
| The Martinique | — |
| Thomson Meter Co. | 21 |
| Tiffin Wagon Co. | — |
| Truscon Steel Co. | 7 |
| **U** | |
| Union Water Meter Co. | 25 |
| U. S. Cast Iron Pipe & Fdy. Co. | 26 |
| Universal Road Mach. Co. | 4 |
| **V** | |
| Vulcan Incinerator Co. | 26 |
| **W** | |
| Warren Bros. Co. | 2 |
| Weber, F., Co. | 6 |
| Western Structural Co. | — |
| Wiard Plow Co. | — |
| Wood, R. D., & Co. | 8 |
| Wyckoff Pipe & Creo. Co., Inc. | 4 |
| Wyckoff & Son Co., A. | 8 |


# BUYERS' CLASSIFIED DIRECTORY

**(CONTINUED)**

**STREET CLEANING AND REFUSE DISPOSAL**

**Ash Bodies**
Heil Co.

**Carts**
Acme Road Mchy. Co.
Columbia Wagon & Body Co
Tiffin Wagon Co.

**Garbage Bodies, Steel**
Columbia Wagon & Body Co.
Heil Co., The

**Manholes—Catch Basins**
Burch Plow Works Co.
Wm. E. Dee Co.
South Bend Foundry Co.

**Incinerators**
Stacy-Bates Co.
Vulcan Incinerator Co.

**Shovels**
Wyoming Shovel Works

**Sprinkling Wagons and Flushers**
Austin-West. Rd. Mach. Co.
Good Rds. Mchy. Co., Inc.
The Kinney Mfg. Co.
Tiffin Wagon Co.

**Street Flushing Hose**
Goodyear Tire & Rubber Co.

**Street Sweepers**
Austin-West. Rd. Mach. Co.
Ohio Municipal Equip. Co.

**STREET SIGNS**
Ingram-Richardson Co.

**WATER WORKS**

**Air Compressors**
Ingersoll-Rand Co.
Schramm, Chris. D., & Son
Sullivan Machy. Co.

**Air Lift**
Ingersoll-Rand Co.

**Brass Water Connection**
Mueller, H., Mfg. Co.

**Centrifugal Pumps**
Aurora Pump & Mfg. Co.

**Chloride of Lime**
Penn Salt Mfg. Co.

**Chlorine Liquid**
Electro Bleaching Gas. Co.

**Deep Well Drills**
Ingersoll-Rand Co.

**Deep Well Pumps**
Aurora Pump & Mfg. Co.
Cook, A. D.
Ingersoll-Rand Co.

**Disinfecting Chemicals**
Electro Bleaching Gas Co.
Penn Salt Mfg. Co.

**Filters**
N. Y. Continental Jewel Filtration Co.

**Filtration Plants**
Norwood Engineering Co.

**Filter Alum**
Du Pont de Nemours Co.

**Fire Hydrants**
Clark Co., H. W.
R. D. Wood & Co.

**Flap Valves**
Coldwell-Wilcox Co.

**Meters**
Badger Meter Mfg. Co.
Clark Co., H. W.
Hersey Mfg. Co.
Pittsburgh Meter Co.
Thompson Meter Co.
Union Water Meter Co.

**Meter Boxes**
H. W. Clark Co.
Pittsburgh Meter Co.

**Meter Testing Machines**
H. W. Clark Co.
Mueller, H., Mfg. Co.
Pittsburgh Meter Co.

**Pipe, Cast Iron**
National Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Fdy. Co.

**Pipe, Steel**
East Jersey Pipe Co.

**Pipe, Wood**
A. Wyckoff & Son Co.
Wyckoff Pipe & Creo. Co., Inc.

**Pumps**
Aurora Pump & Mfg. Co.
H. W. Clark Co.
Cook, A. D.
Schramm, Chris. D., & Son
Sullivan Mchy. Co.

**Pumping Engines**
Schramm, Chris. D., & Son
Sterling Engine Co.

**Screens for Wells**
Cook, A. D.

**Service Boxes**
Mueller, H., Mfg. Co.

**Shear Valves**
Coldwell-Wilcox Co.

**Sleeves and Valves**
Mueller, H., Mfg. Co.
Smith, A. P., Mfg. Co.

**Sluice Gates**
Coldwell-Wilcox Co.

**Sprinkling and Flushing Hydrants**
Mueller, H., Mfg. Co.

**Steel Stacks**
Heil Co., The
Honhorst, Jos., Co.

**Strainers**
Cook, A. D.

**Tanks**
Farasey, J. D., Mfg. Co.
Heil Co., The
Honhorst, Jos., Co.

**Tanks, Towers, Standpipes**
Connery & Co., Inc.
Farasey, J. D., Mfg. Co.

**Tapping Machines**
Mueller, H., Mfg. Co.
Smith, A. P., Mfg. Co.

**Tunnel Liner Plates**
Truscon Steel Co.

**Valves**
Clark Co., H. W.
Mueller, H., Mfg. Co.

**Water Main Cleaning**
National Water Main Cleaning Co.

**Water Purification**
Electro Bleaching Gas Co
N. Y. Continental Jewel Filtration Co.

**Water Sterilization**
Electro Bleach Gas Co.

**Water Strainers**
Mueller, H., Mfg. Co.

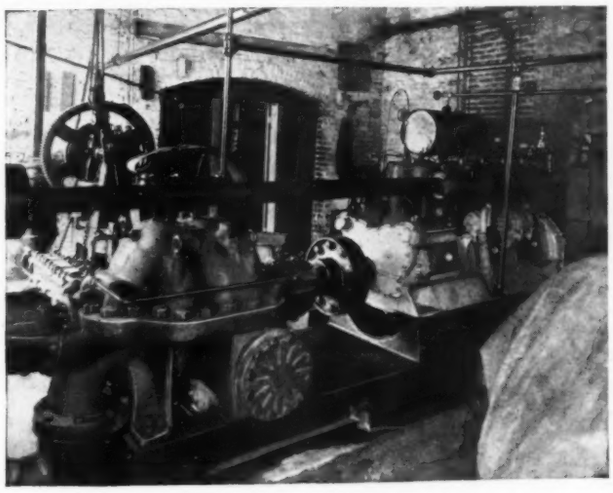
**Water Supply from Well Systems**
Cook, A. D.
Heil Co., The

## EMERGENCY!

**Sterling**
THE ENGINE of REFINEMENT
For the finest boats that float

A highly developed gasoline engine, costing less than steam to operate, for standby service on centrifugal pumps and electric generators. Costs $20.00 per H. P.

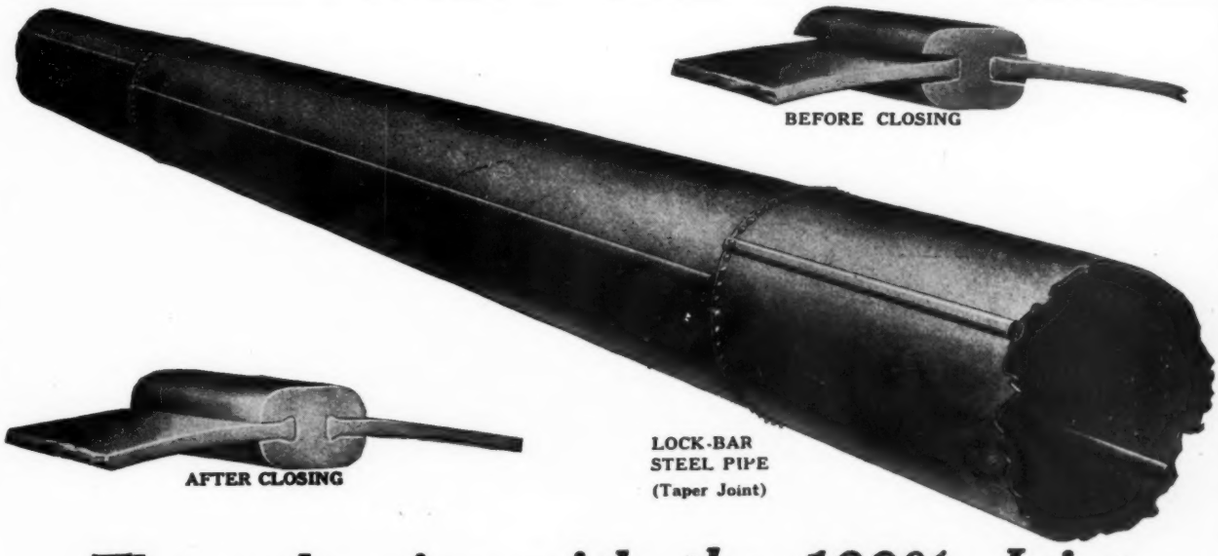
**Assures power instantly at low cost**



Six cylinder 145 H. P. STERLING direct connected 2 stage Alberger centrifugal 1000 G.P.M. 100 lbs. pressure furnished through Reeves & Skinner, St. Louis, Mo. Reserve pump installed at Marion, Ill.

**STERLING ENGINE CO., Department C-5, BUFFALO, N. Y.**

**40 to 300 H. P. at 1200-1500 R. P. M.**




## *The only pipe with the 100% Joint*

**STRENGTH:** The Lock Bar is as strong as the steel itself.

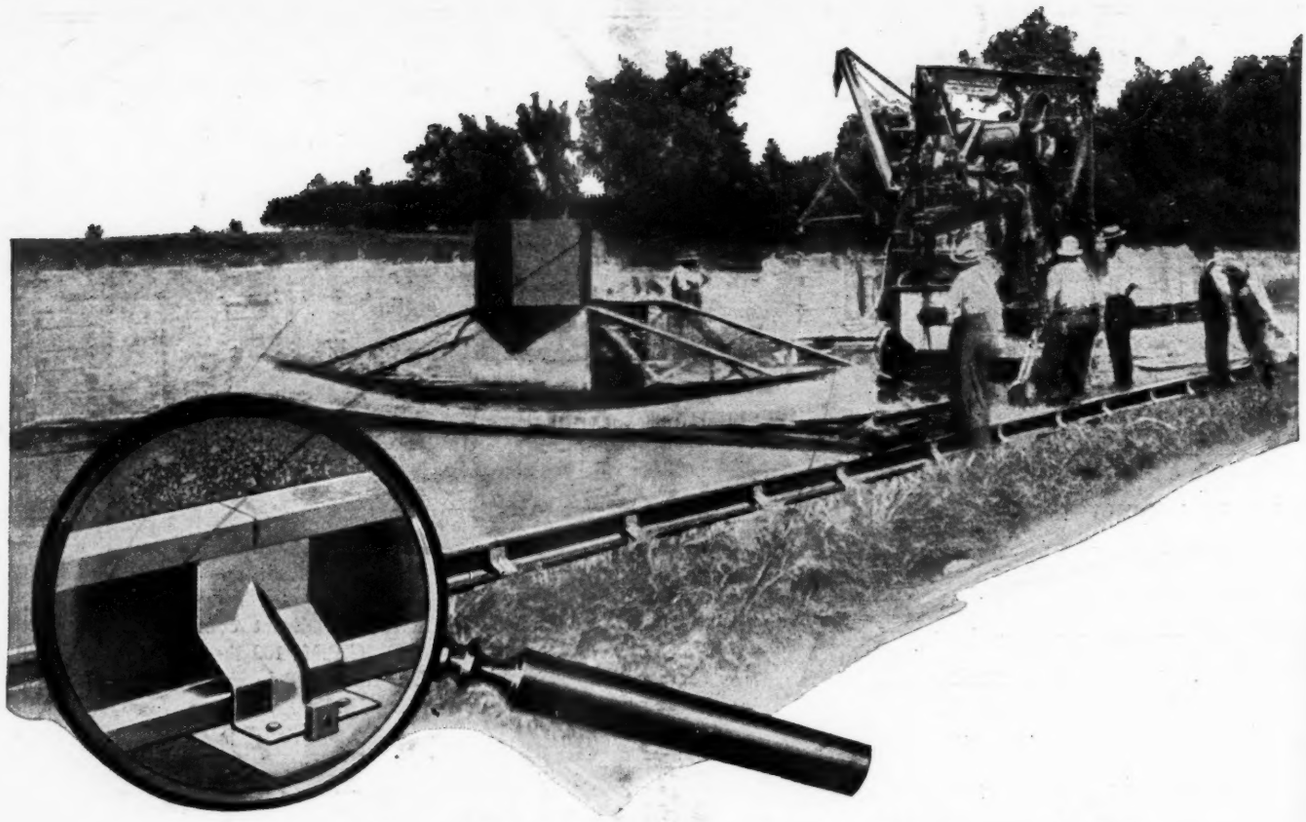
**CAPACITY:** Will carry 15% more water than riveted pipe because of smooth interior, absence of rivets, and joints 30′ apart.

**DURABILITY:** Satisfactory service upwards of 70 years.

*"Hand-book of Pipe" for Executives, on request.*

**EAST JERSEY PIPE COMPANY**

**7 DEY STREET** **NEW YORK, N. Y.**



# You Can Set Heltzel Forms Easily and Quickly

Heltzel steel forms are built like a railroad—a rail, a pedestal and a stake—no keys, wedges or clamps. No right or left hand rails.

Line the pedestals, lay the rails and place them on the pedestals by simply fitting the rail groove over the pedestal flange—fits snug and secure—a perfect joint.

The top of the rail hangs on the pedestal top; the bottom of the rail rests flat on the pedestal base and solidly against the pedestal upright making a joint absolutely rigid and guaranteeing a perfect alignment.

And Heltzel steel forms are just as easy to remove. No rivets, holes or odd-shaped crevices to catch and hold concrete—simply pull the stakes and a slight pull at the joint loosens the rail from the concrete and the entire length is easily and quickly removed. Oil the forms and they are ready to use again. You can clean and oil Heltzel forms for ninety per cent less than any other form.

Heltzel steel forms save many times their cost in labor and time. They have done this on large and small jobs and under varied conditions for contractors in every state in the country and you can safely expect them to give you the same kind of service.

**Write for the Heltzel Blue Book**

The confines of the average page of space are too limited to tell you all you will want to know about how Heltzel steel forms are built like a railroad and how this means better road building for less money. Complete details are contained in the Heltzel Blue Book and a copy is ready and waiting to be sent without obligation to you. Will you please write for yours?

## The Heltzel Steel Form & Iron Co., Warren, Ohio

*Largest exclusive builders of steel forms for Road, Sidewalk, Curb, Curb-and-Gutter and all types of concrete construction and Tamping Machines, Heltzel Hand Strikeoff Tamp, Heltzel Rotary Steel Float, and other accessories.*

# HELTZEL STEEL FORMS